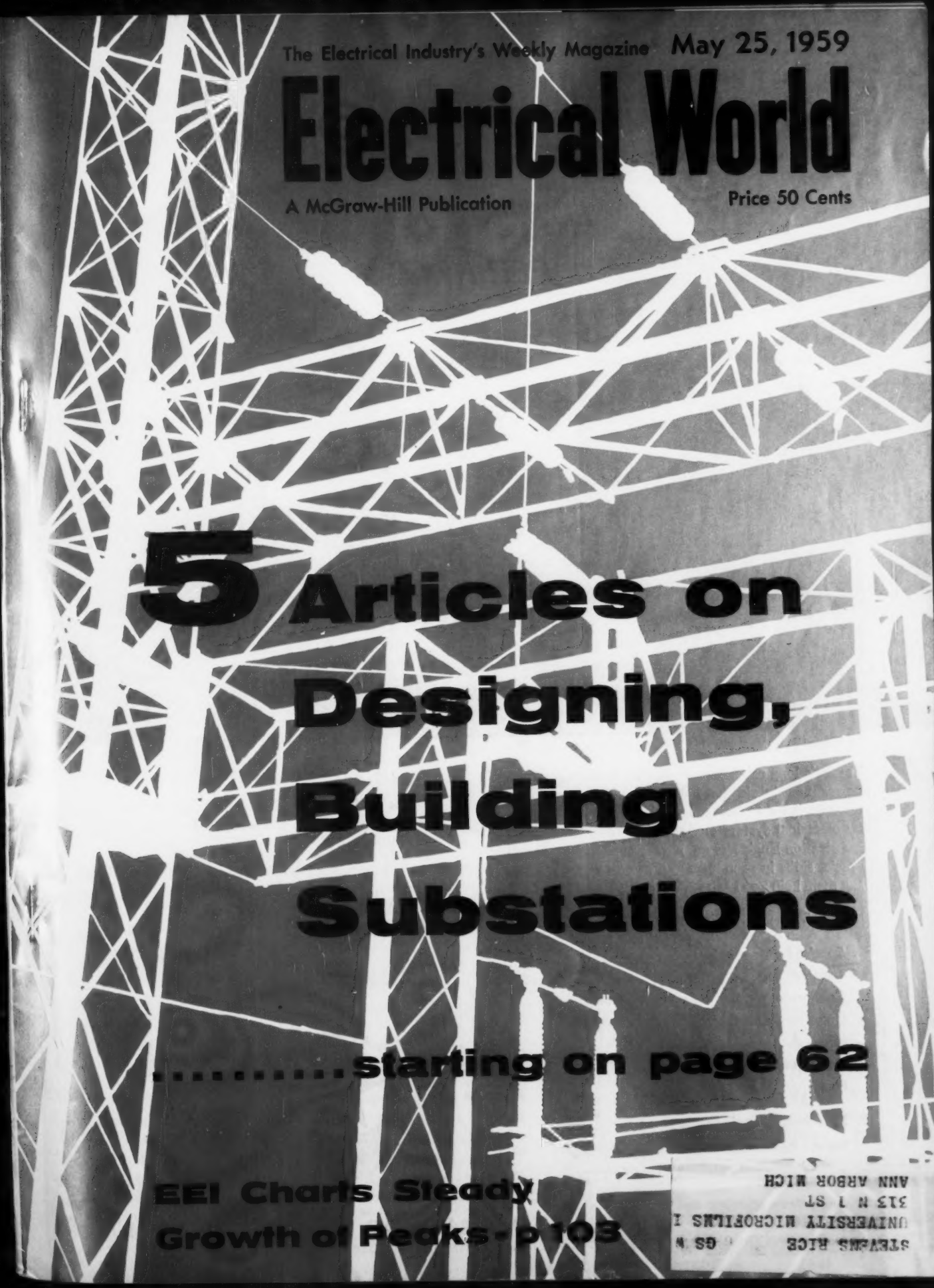
The Electrical Industry's Weekly Magazine May 25, 1959

Electrical World

A McGraw-Hill Publication

Price 50 Cents



5 Articles on Designing, Building Substations

.....starting on page 62

EEI Charts Steady Growth of Peaks - p 103

STEVENS RICE GS N
UNIVERSITY MICROFILMS I
313 N 1 ST
ANN ARBOR MICH

Let Texaco help you achieve LOWER COST PER Kwhr

Texaco's long experience in dealing with every phase of power plant lubrication has resulted in a series of lubricants designed to meet the special problems encountered by electrical system engineers. Furthermore, Texaco Lubrication Engineers are always available to lend their special skills in routine as well as emergency situations. Let them help you keep your cost per Kwhr low.

Here's what you get when you specify Texaco:

1. **Special lubricants for:**
   - Turbines
   - Coal processing and handling equipment
   - Crane mechanisms
   - Heavy-duty blowers
   - Motor gear drives
   - Pumps

2. **Experienced engineering service:**

   Texaco Lubrication Engineers are thoroughly familiar with all phases of power plant lubrication.

3. **Fast delivery:**

   Texaco's 2,000 Distributing Plants scattered from coast to coast means there is one near your power plant to give you fast delivery.

For more information on Texaco's complete power plant service, contact your nearest Texaco Distributing Plant, or write:

Texaco Inc., 135 East 42nd Street, New York 17, N.Y.

LUBRICATION IS A MAJOR FACTOR IN COST CONTROL

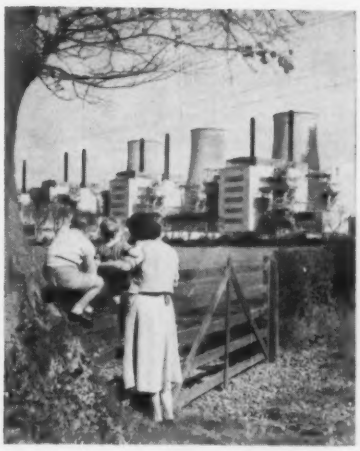
(PARTS, INVENTORY, PRODUCTION, DOWNTIME, MAINTENANCE)

Electrical World

Vol. 151, No. 21 MAY 25, 1959

Published for 85 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

In This Week's Issue



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CURRENT EVENTS

Ad Men Appraise Public Information Efforts

PUAA meeting in Dallas explores methods and plans to improve investor-owned utility understanding.....p 56

Scotland's Chapelcross A-Plant Joins Grid

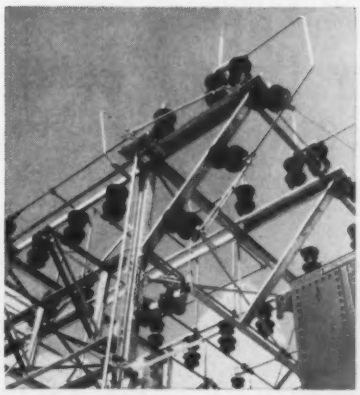
Formally inaugurated this month, the 140-Mw nuclear station is now feeding into the British network.....p 58

MANAGEMENT NEWSLETTER

EEI Charts Steady Growth of Peaks

Twenty-fifth Power Survey shows peak loads rising at 7½% annual rate, summer peaks gaining.....p 103

A Progress Report



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What's New in Substation Design, Building?

Aluminum Bus Saves in Substation Design
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Dual Cooling Ups Bank Rating for Emergency
E. J. Kelly, Philadelphia Electric; T H. Progler, Allis Chalmers..p 64

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Expulsion Breaker Protects Sub
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Automatic Ground Switch Protects Tapped Sub
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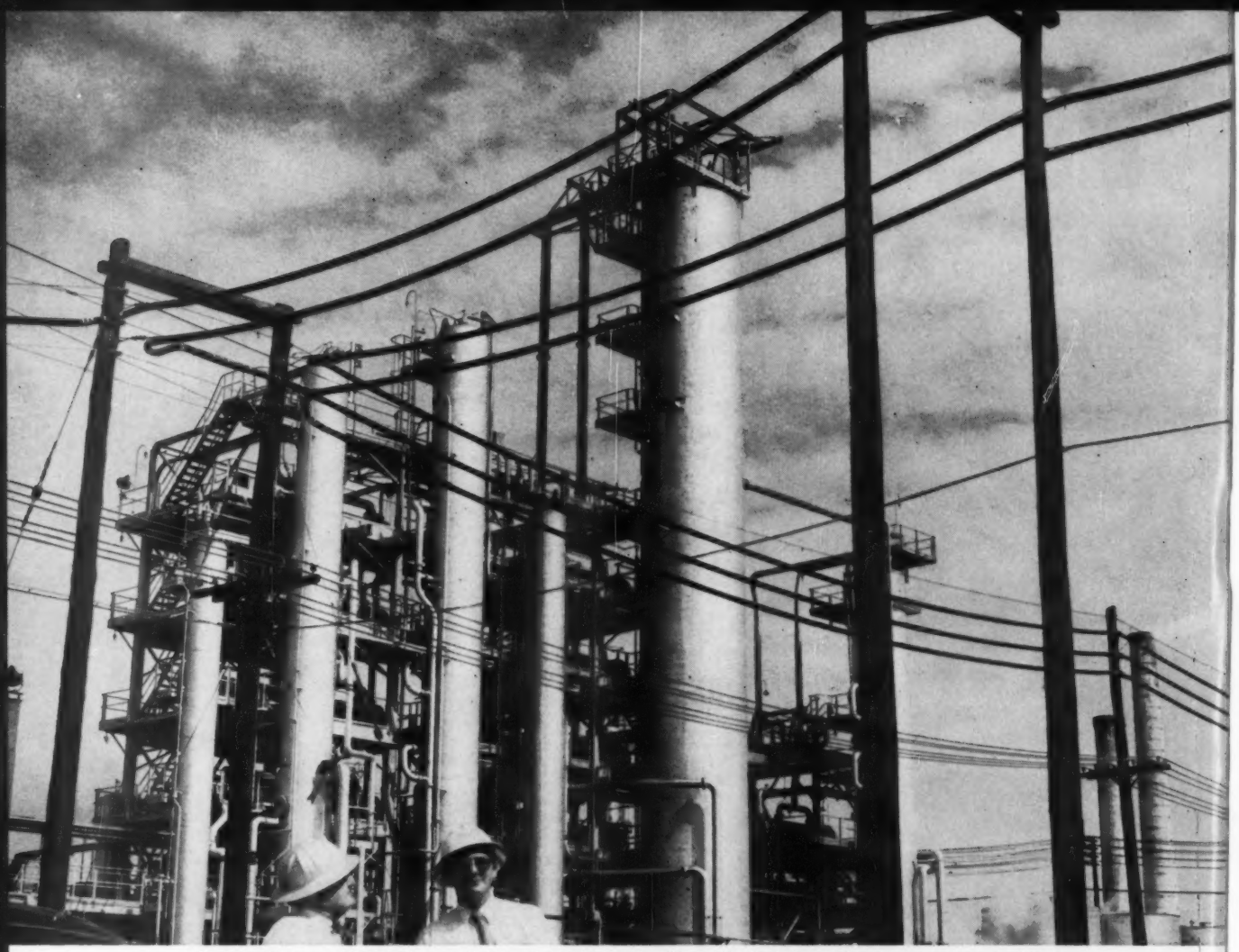

Okonex-Okoprene 15kv primary distribution cables solve Magnolia Petroleum Company's space problem and climate problem (wet and salty atmosphere) and provide greater safety in its Beaumont refinery.

Magnolia Refinery improves voltage regulation, beats humidity with Okonex-Okoprene cables

The giant 1,500-acre Magnolia Petroleum Company refinery, located on the broad Gulf Coast Plain, generates and uses 900,000 kilowatt hours a day, more than its neighboring city of Beaumont, Texas. A cable breakdown here could cause costly damage to equipment and the material in process (more than 400 oil products are manufactured). The entire cable system must serve Magnolia's round-the-clock operation without interruption in the face of the high moisture-saline content of the air, plus the chemicals and intense heat used at many of the processing units.

For the 15kv primary aerial loop distribution system, Magnolia's engineers selected shielded Okonex-Okoprene cables. These butyl-base insulated, neoprene-sheathed constructions saved space, eliminated safety problems and provided improved voltage regulation far superior to previous open wire constructions and other insulated cable constructions studied. In addition, their excellent moisture, heat and corrosion resistance were important assurances of maximum service life.

Okonex-Okoprene, in 3,000 to 15,000 volt constructions, was also used for trunk feeders to and from substations, tie lines and motor leads installed both aerially and underground.

To help you specify the optimum cable for your important power and control cable needs, contact your Okonite representative or write for the free Bulletin EW-1117, "How to choose insulated cable," to The Okonite Company, Passaic, New Jersey.

where there's electrical power . . . there's **OKONITE CABLE**

6339

Do Eyes Need Light?

On Sunday, April 12, 1959, my son came to me with a glitter in his eye. He shoved a copy of This Week magazine in front of me and said, "Read this and don't try to kid me anymore". This is a direct quote:

"Healthy eyes cannot be damaged, or become diseased, because of too much reading, small print, **poor illumination,** fluorescent lighting, lack of glasses, incorrect glasses, cheap sun glasses or television," wrote Dr. Edward S. Gifford, Jr., Chief Ophthalmologist, Pennsylvania Hospital.

You can understand how chagrined I was when my son showed me this article. For years I had been turning on lights when I found him reading with poor illumination. I had been insisting upon proper lighting in the television room. I had argued that his brother was wearing glasses because he had neglected to use proper lights to study by.

Other experts will certainly tell you that poor illumination for certain tasks will cause eye strain which could lead to other body disorders. And Dr. Gifford would probably agree that good lighting is needed for efficient reading and study.

Fischer Black

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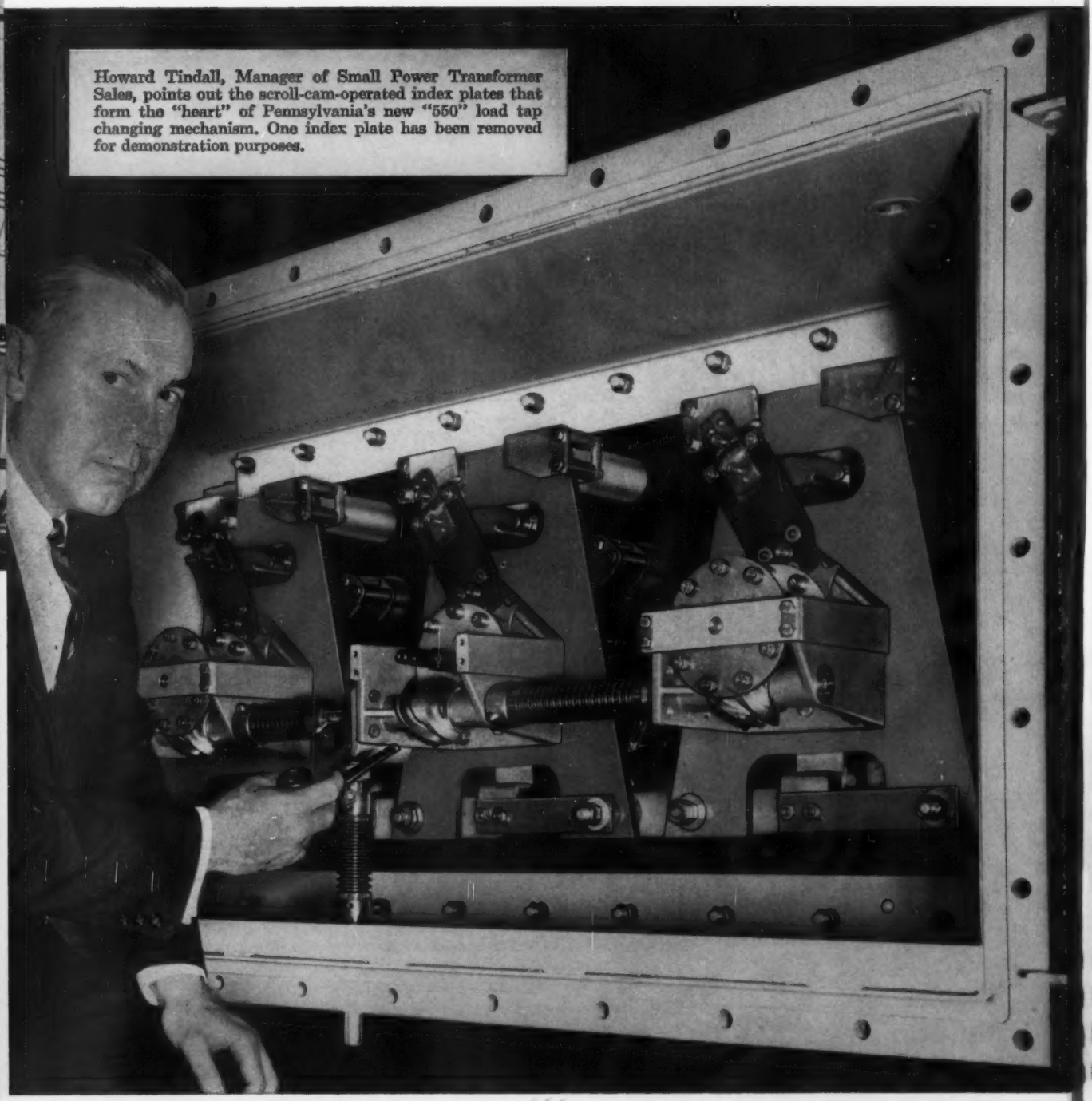
MORE THAN A PRICE



Howard Tindall, Manager of Small Power Transformer Sales, points out the scroll-cam-operated index plates that form the "heart" of Pennsylvania's new "550" load tap changing mechanism. One index plate has been removed for demonstration purposes.

PENNSYLVANIA POWER

REDUCTION!

Direct-drive unit now standard on Pennsylvania LTC Transformers rated 10,000 kva and below

New "550" LTC mechanism brings SAVINGS UP TO 18% plus operating advantages

Lest the fact be overlooked in all the talk about price reductions, it should be pointed out again that power transformer purchasers get *more for less* as a result of Pennsylvania Transformer's recent 10 to 18% reduction in the cost of load tap changing transformers rated 10,000 kva and below.

The reason is simply that Pennsylvania's LTC price reduction is the result of a major improvement in LTC design. Operated by direct drive, the "550" LTC mechanism is a *much simpler* but also a *much more rugged* mechanism than the unit it replaces. Thus, in addition to important savings in initial purchase cost, Pennsylvania's new load tap changing mechanism provides the following advantages on all LTC three-phase transformers covered by ASA Standard C57.12A, on special transformers in equivalent sizes, and on equivalent step voltage regulators:

Easier, less costly installation

The new "550" is only half as large as the LTC mechanism it replaces, and weighs only 25% as much as the old unit. This means easier handling, smaller pads or platforms, and savings in installation time and costs.

Year-in, year-out uniformity of operation

Direct drive of contacts through a scroll cam and index plates means that switching speed and positioning will remain uniform throughout many years of operation. Splined shafts preclude any misalignment of drive components.

Longer contact life, less oil deterioration

Optimum switching speed—accomplished by use of the scroll-cam-operated index plates—means that the arc is interrupted more efficiently, with less contact erosion and less oil deterioration. This results in less oil maintenance and longer contact life.

Quieter operation

Completely controlled movement and speed made possible by the direct-drive design eliminates bumper springs. Contacts close gently, without bounce or excessive mechanical shock.

Easier inspection and maintenance

Inspection of switch compartment is faster, easier because only half as much oil is used as in the previous compartment. Both switch and drive compartments contain subassemblies that are relatively easy to remove and replace.

These economic and operating advantages are just a few of the reasons why Pennsylvania's new "550" LTC gives you *more for less*. For additional details or a discussion of your own utility's needs, contact Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pa. Phone: Sherwood 5-9100.

McGRAW EDISON

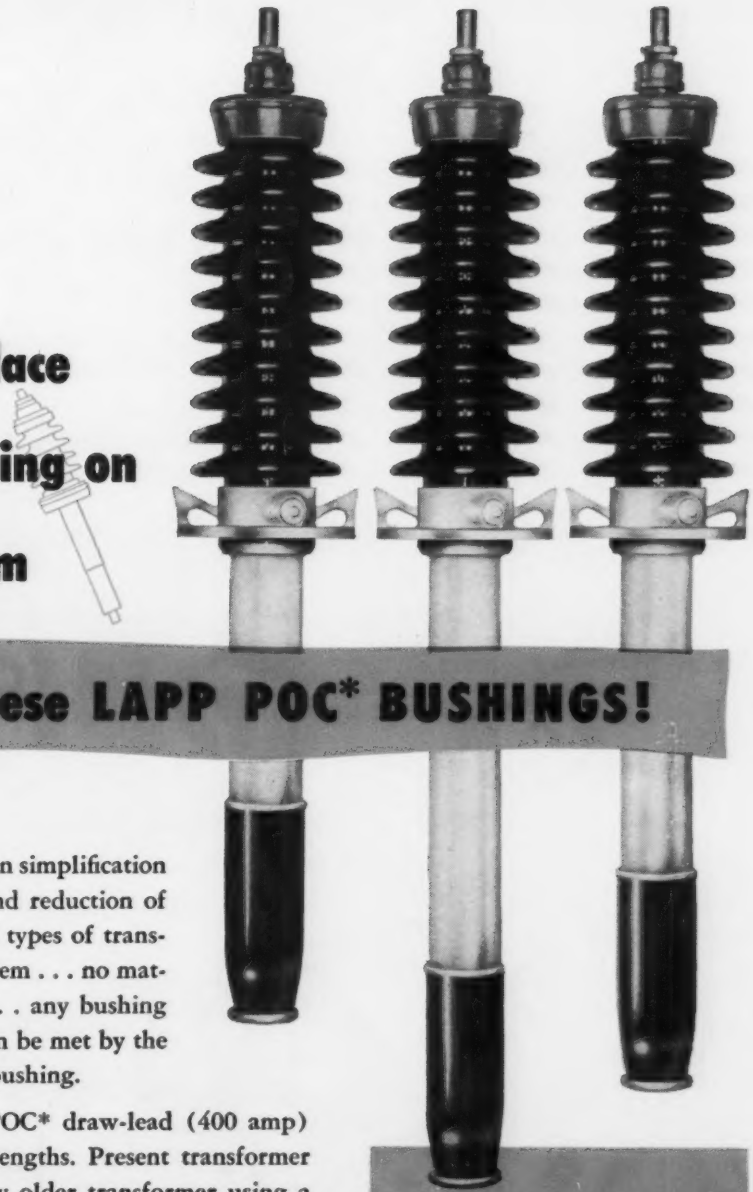
T R A N S F O R M E R S

Long bow, utility pole or railroad tie—whatever the product—serviceability largely hinges on the method of preservation. Equally critical is the quality of the stock you start with...the raw material. Your wood investment is protected on two counts when you specify AMCRECO pressure treated products. First, a time-tested treating technique, confirmed by major industrial users coast to coast. Second, a 1,500,000-acre timber supply...vast and versatile enough to assure you highest quality grades regardless of your requirements or delivery deadline.

AMERICAN CREOSOTING CORPORATION AMCRECO PRESSURE TREATED WOOD PRODUCTS Louisville 2, Kentucky

Subsidiary of Union Bag-Camp Paper Corporation

You can replace *any* draw-lead bushing on your 69 kv system



with one of these LAPP POC* BUSHINGS!

Here's a real saving for you in simplification of warehouse inventories and reduction of costs! No matter how many types of transformers may be on your system . . . no matter how old they may be . . . any bushing replacement requirement can be met by the Lapp POC* ASA Standard bushing.

At 69 kv, for example, the Lapp POC* draw-lead (400 amp) bushing is made in just three shank lengths. Present transformer designs call for these bushings. On any older transformer using a pre-standard bushing, one of these will also fit perfectly; all that is required is a simple flange adapter which provides for differences in mounting details, and for length and clearances.

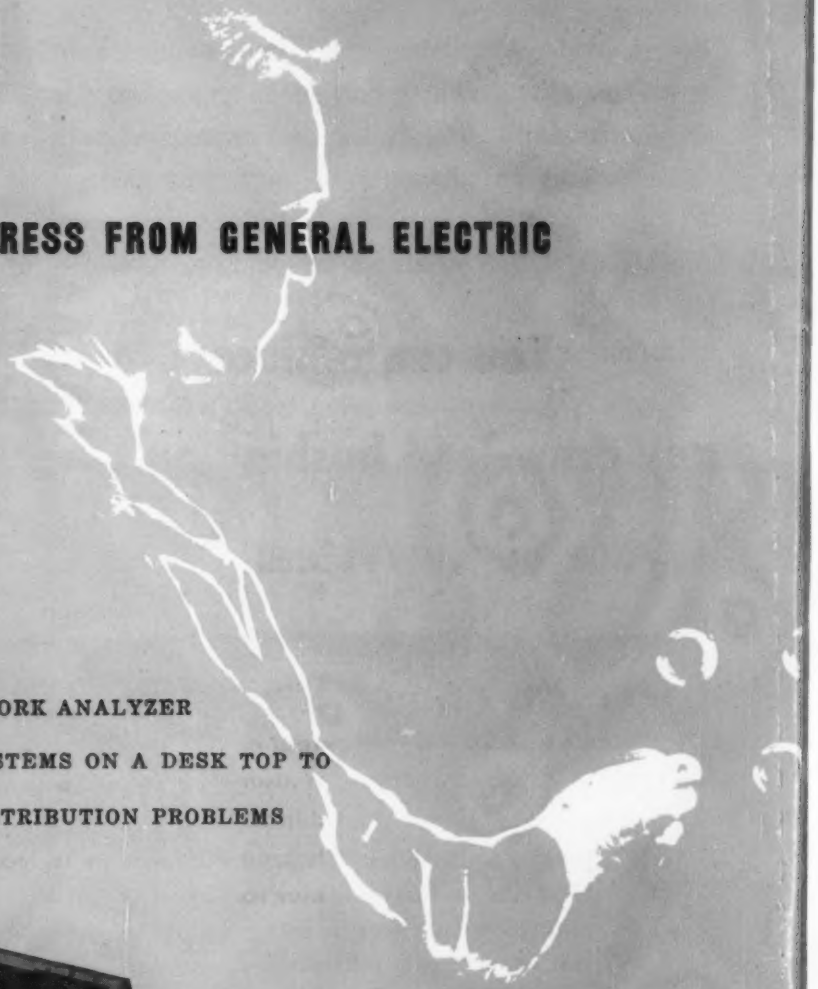
Lapp can supply POC* Bushings for your stand-by stocks in voltage ratings 15 kv to 161 kv. Also, we'll design and supply, at nominal cost, non-magnetic flange adapters which will adapt these ASA Standard bushings to every transformer on your system. Give us data on the transformer bushings you now have in service. Let us show you the economies you can effect by reducing your entire stock of spare bushings to the required sizes of Lapp POC* Bushings and a suitable assortment of flange adapters. You'll never be without the replacement bushing you need, and you will save spectacularly in warehouse space . . . in stock maintenance labor costs . . . in investment in inventory. Lapp Insulator Co., Inc., Le Roy, New York.

Lapp

POC* BUSHING

*PAPER-OIL CONDENSER TYPE
TOTALLY-ENCLOSED CORE
ASA STANDARD

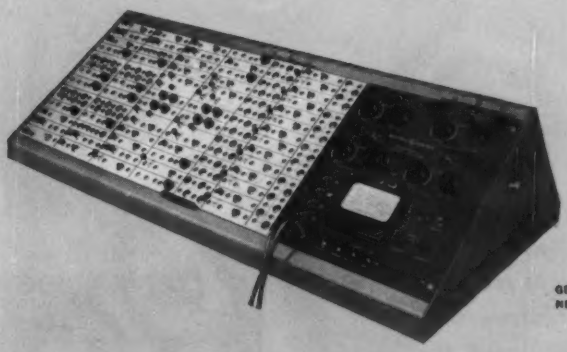
COMPUTER PROGRESS FROM GENERAL ELECTRIC



GE 307 MINIATURIZED AC NETWORK ANALYZER

SIMULATES 4-STATION POWER SYSTEMS ON A DESK TOP TO

SOLVE TRANSMISSION AND DISTRIBUTION PROBLEMS



GE 307 MINIATURIZED AC NETWORK ANALYZER

Here is another example of G-E custom computer design specifically for utility application. The Miniaturized Network Analyzer solves problems too large for hand calculation, but too small to justify taking them to a large network analyzer installation. Actual detailed solutions may be obtained for such day to day problems as:

• Load flow studies • Analysis of transmission requirements to supply new loads and transmission capabilities of existing systems or proposed additions • Calculation of specifications and optimum locations for additions to portions of existing networks

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FOR FIGURES IN A HURRY—FIGURE ON A GE COMPUTER

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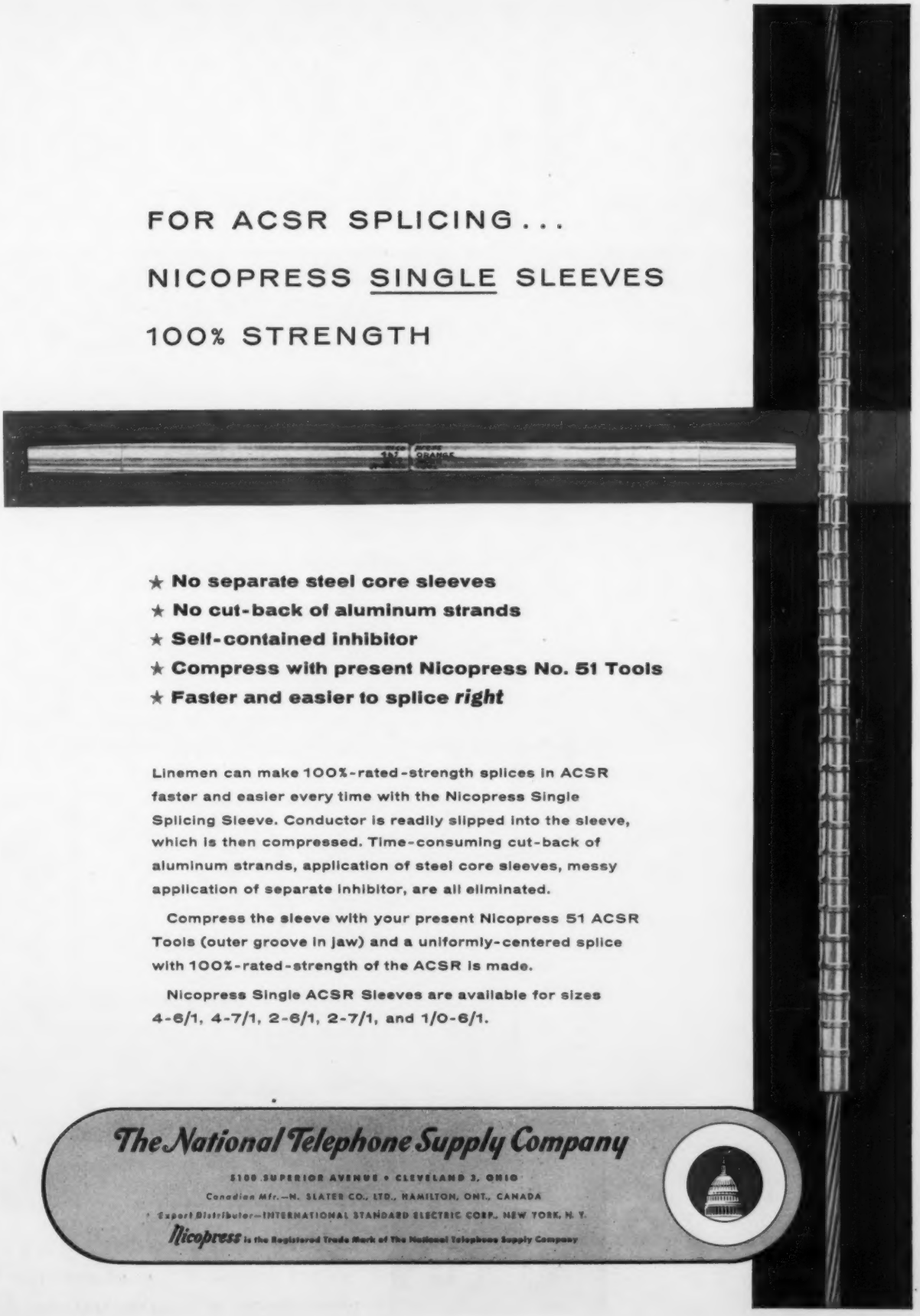
FOR ACSR SPLICING...

NICOPRESS SINGLE SLEEVES

100% STRENGTH



★ **No separate steel core sleeves**
★ **No cut-back of aluminum strands**
★ **Self-contained inhibitor**
★ **Compress with present Nicopress No. 51 Tools**
★ **Faster and easier to splice *right***

Linemen can make 100%-rated-strength splices in ACSR faster and easier every time with the Nicopress Single Splicing Sleeve. Conductor is readily slipped into the sleeve, which is then compressed. Time-consuming cut-back of aluminum strands, application of steel core sleeves, messy application of separate inhibitor, are all eliminated.

Compress the sleeve with your present Nicopress 51 ACSR Tools (outer groove in jaw) and a uniformly-centered splice with 100%-rated-strength of the ACSR is made.

Nicopress Single ACSR Sleeves are available for sizes 4-6/1, 4-7/1, 2-6/1, 2-7/1, and 1/0-6/1.

The National Telephone Supply Company

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Canadian Mfr.—N. SLATER CO., LTD., HAMILTON, ONT., CANADA

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Nicopress is the Registered Trade Mark of The National Telephone Supply Company

PRE-ASSEMBLED DOUBLE CIRCUIT INTEGRATED SUBSTATION

THE FIRST INTEGRATED SUBSTATION is operating at Thornlown, Indiana . . . developed by the Public Service Company of Indiana, Inc. and Moloney Electric Company . . . designed and built to provide an efficient, economical means of serving outlying areas.

This type of unit has several distinct advantages over conventional methods of substation construction . . .

- Considerably less time is required for erection thereby effecting a saving in field assembly costs and assuring an early in-service date.
- Less handling and storage of materials.
- Engineering and purchasing time are minimized.
- Standard mounting arrangement of the low voltage structure permits replacement of the transformer with a larger unit in the event of future load growth.
- Portability.

Contact your local Moloney representative for additional information on the Integrated Substation.

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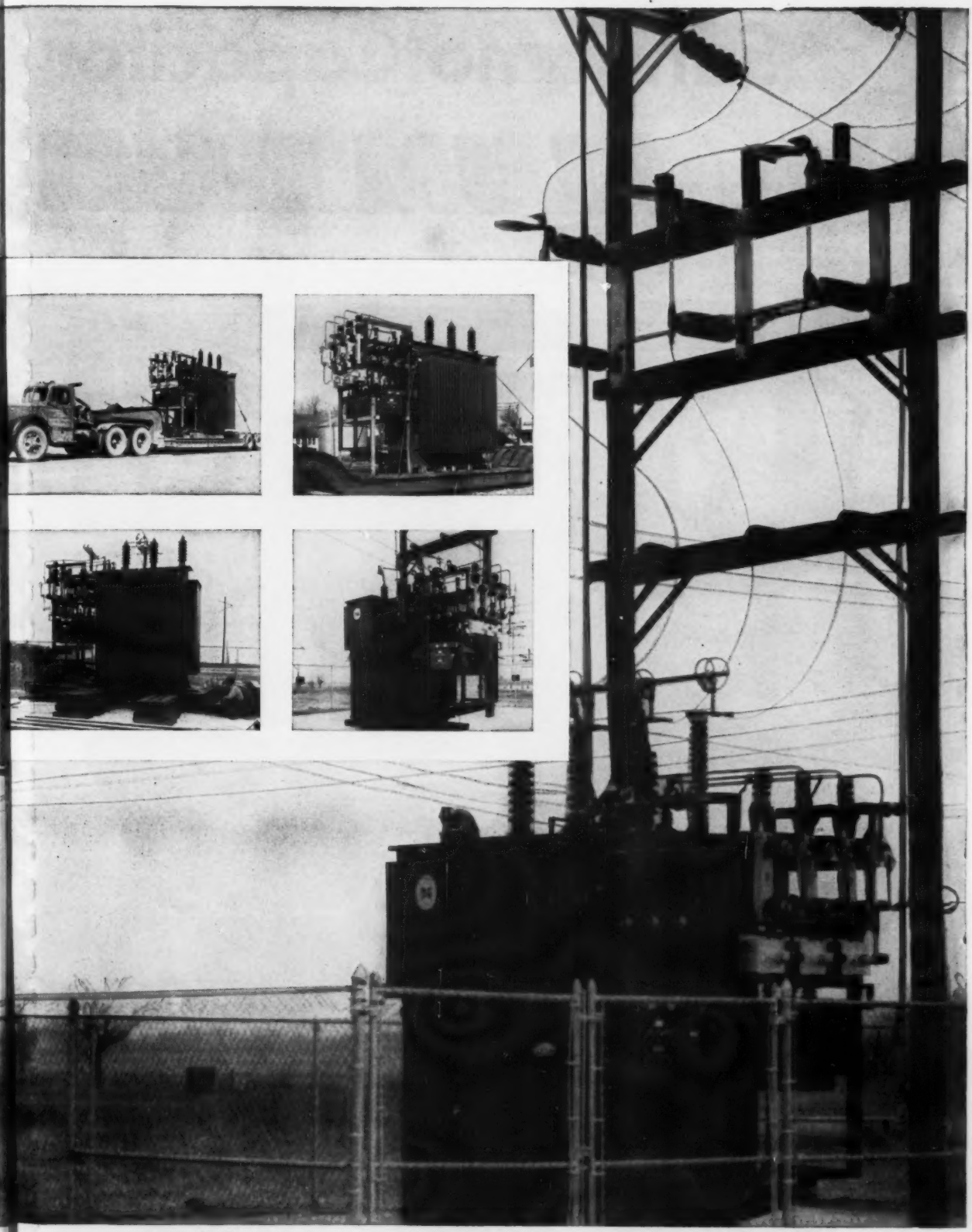
Manufacturers of

SALES OFFICES IN ALL PRINCIPAL CITIES



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Transformers for Utilities, Industry, and Electronic Applications

FACTORIES AT ST. LOUIS 20, MO. AND TORONTO, ONT., CANADA

Sangamo Capacitor
ALUMINUM

Stainless Steel Cases

Strong, lightweight open type units are easy to handle during installation . . . require minimum maintenance.

50TH ANNIVERSARY SANGAMO 1930 - 1980

SANGAMO ELECTRIC COMPANY

SPRINGFIELD, ILLINOIS

Equipments with RACKS...reduce weight per KVAR as much as 11 per cent

These Sangamo capacitor equipments give you the advantages of welded structural aluminum alloy racks—*plus* stainless steel cases as standard equipment—to assure long life under all atmospheric conditions.

Less weight per KVAR makes them easier to transport, to handle, and to mount. Maintenance costs are greatly reduced because of the excellent corrosion resistance, high strength, and long service life of these equipments.

Sangamo pole-type equipments are available in In-Line, Multi-Row, and Cluster Mount assemblies in ratings from 150 to 1200 KVAR for use in distribution systems of 2.3 to 13.8 KV.

Open type equipments, composed of stacking units, are available for all high voltage applications.

For details, consult your Sangamo Representative, or write for Bulletins 1153 and 1154.

Sangamo equipments are real "pole-savers"... light weight keeps bending moment low.

Stainless Steel Cases

PC59-1

WHY SPLICE AND TAPE.

- **Needs no tape**
- **True 2-hand installation**
- **Color coded, clearly printed**

INS

pre-insulated service entrance

QUICK

Forget about taping when you connect service drop to service entrance with INSULINK, pre-insulated compression connector for copper and aluminum. Connectors are color coded for quick identification of conductor size range.

EASY

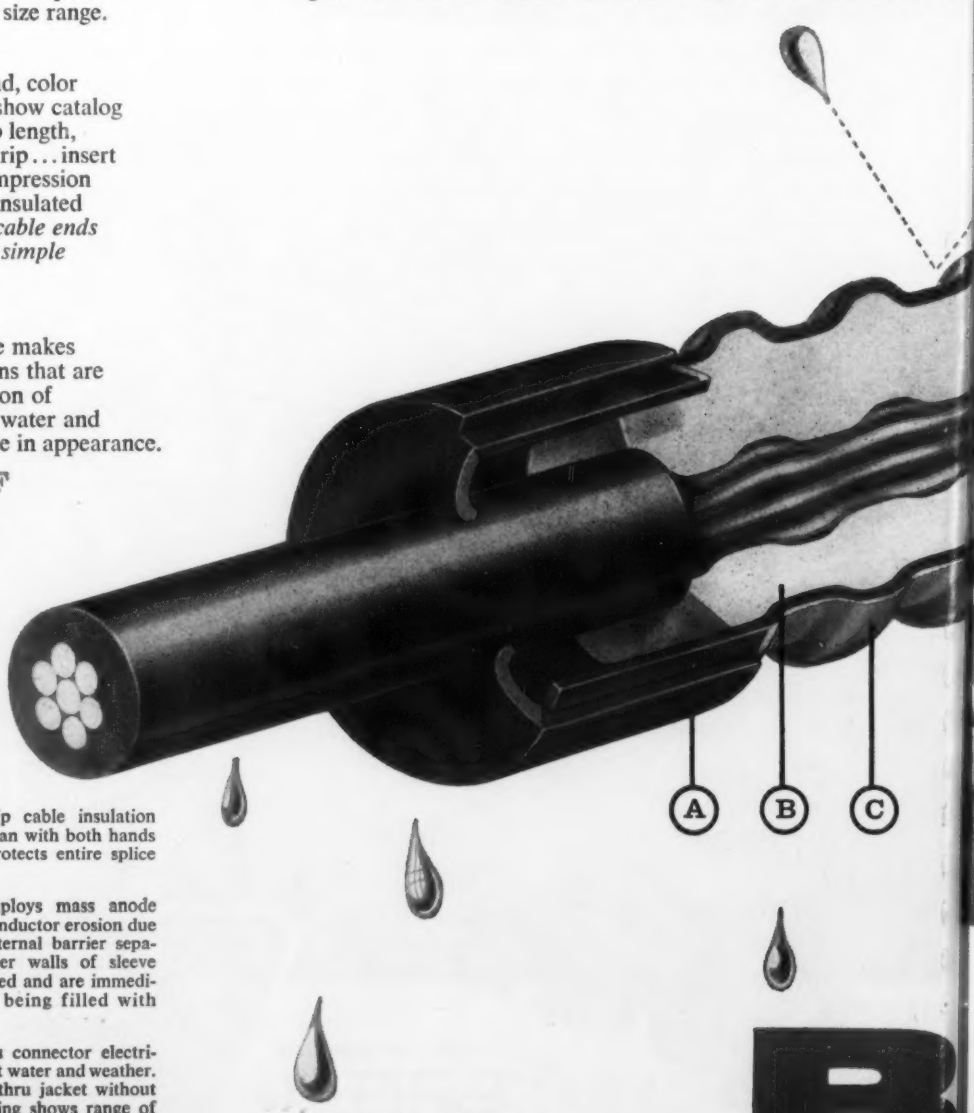
Clearly printed, easy to read, color coded jacket is marked to show catalog number, cable ranges, strip length, and where to crimp. Just strip... insert ...crimp with the same compression tool and grooves as for uninsulated splices. *The caps grip the cable ends and hold them in place for simple two-hand installation.*

SAFE

This quick, easy procedure makes service entrance connections that are fully insulated for protection of personnel, protected from water and weather, neat and attractive in appearance.

WIDE RANGE OF COMBINATIONS

#10 str–1/0 str copper
or aluminum
#6–#2 ACSR



(A) **Polyethylene caps** grip cable insulation securely, leaving lineman with both hands free for crimping...protects entire splice against moisture.

(B) **Aluminum sleeve** employs mass anode principle, eliminates conductor erosion due to galvanic action; internal barrier separates conductors. Inner walls of sleeve have oxide film removed and are immediately coated before being filled with PENETROX.

(C) **Nylon jacket** insulates connector electrically, protects it against water and weather. Standard tools crimp thru jacket without piercing it. Color coding shows range of cable sizes each INSULINK accommodates; arrow shows cable strip length; lines show where to crimp.

FOR FURTHER INFORMATION AND SAMPLE, WRITE:

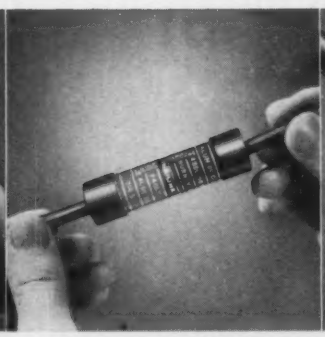
. just connect with

SULINK®

Patd. Other pats. pending

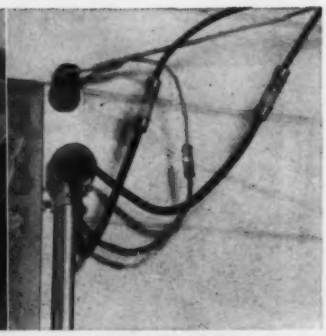
connector for time-saving 2-hand installation

Strip back phase-wire insulation . . . arrows on INSULINK show how far.



Insert wire ends until they meet internal barrier; **caps grip and hold cable,** both hands are free for crimping.

Crimp with standard compression tool . . . guide lines on INSULINK show where.



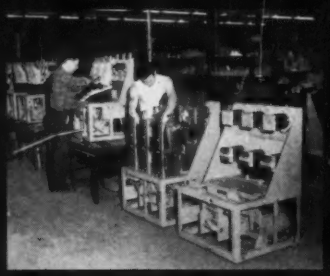
Installed INSULINK fully protects against accidental contact. Weather resistant . . . neat and attractive.

BURNDY

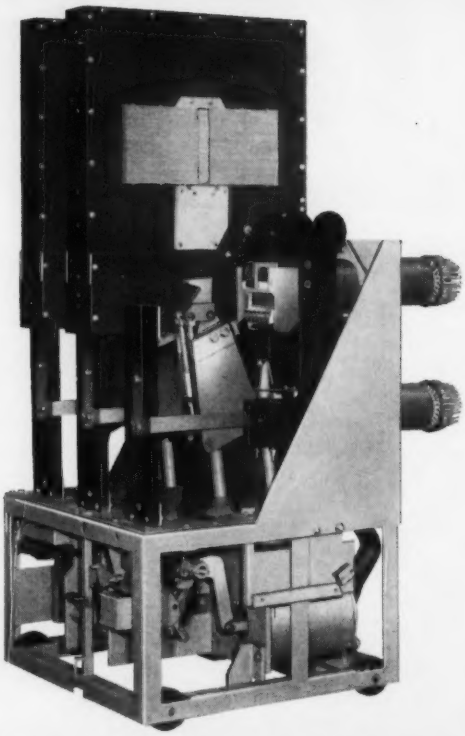
58-32

Norwalk, Connect. In Europe: Antwerp, Belgium Toronto, Canada

Now in service...
controlling and
protecting modern
generating and
distribution systems



NEW BREAKERS BEING ASSEMBLED AND SHIPPED



Type DST 5 kv 350 mva Air Circuit Breaker 1200 and 3000 amps

Federal Pacific's new 5 kv 350 mva Air Circuit Breaker

Your increased capacity requirements dictated its need. Our commitment to provide a complete quality line prompted its manufacture. Latest technicological advances shaped its development. Built for ruggedness, long life, ease of maintenance and inspection, it naturally meets all NEMA, ASA, AEIC and AIEE standards. Federal Pacific has created a new 5 kv, 350 mva Air Circuit Breaker of beautiful proportion, striking simplicity and masterful performance. Write for Bulletin 3-450, Federal Pacific Electric Company, General Offices: Department 259, Newark 1, New Jersey.

FPE **FEDERAL PACIFIC ELECTRIC COMPANY**

The Best in Electrical Distribution and Control Equipment

The Electrical Week

LATE NEWS ▶ **Large-scale A-plants are omitted in authorization bill** recommendations (see p 59) because none of 200 to 300-Mw reactors proposed in recent design studies "is likely to be competitive" in U. S. areas where such big units could be used, says AEC.

An EEI training school on American Economic System will be held in Trinidad, Tex., June 1-5. Texas P&L will be host. Other participating companies: Dallas P&L, Texas Electric Service, West Texas Utilities, El Paso Electric, Southwestern PS, PS of Oklahoma, Empire District Electric, and Southwestern Electric Service. Robb Winsborough, Middle West vp, will conduct course for participants' supervisory personnel.

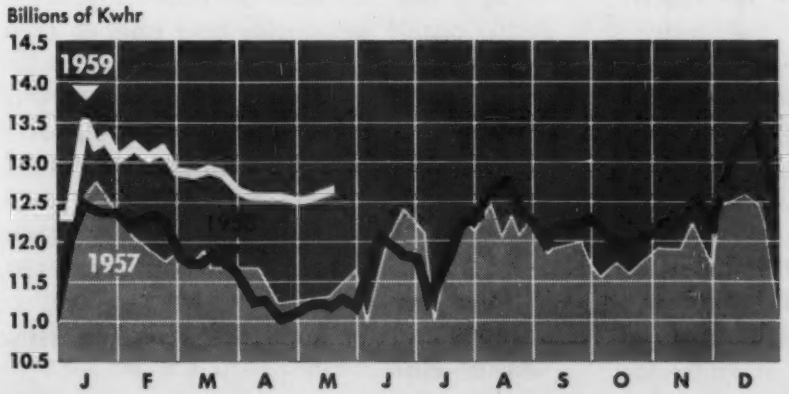
Generators for Wanapum Dam will come from Sweden, if Grant County PUD accepts low basic bid of $88,878,411 submitted by a syndicate of U. S. firms headed by Morrison-Knudsen Co. Bid includes $11,261,500 for the Swedish generators. An alternate plan specifies GE units at $15,650,157.

Con Ed bought three New York Transit Authority power plants for $125,840,000, including assumption of modernization contracts. The sale, which took two minutes, culminated a 20-year debate.

Extreme rain, wind, and tornadoes in Midwest last week failed to interrupt service to customers except for a few isolated outages.

Management changes . . . Middle South Utilities elects W. D. Crawford vp . . . E. A. Shultz and A. Kraakevik become vps of Illinois Power . . . Central Maine Power makes W. H. Dunham executive vp, H. E. Hamilton vp and treasurer, and N. W. Wilson, clerk of the company, acquires vp status . . . Texas Utilities elects B. B. Sanders vp and treasurer . . . O. E. Sawyer becomes chief engineer of New England Electric System . . . Penn-Union Electric elects F. T. Conboy vp and assistant president and L. R. Crane vp-sales.

WEEKLY POWER OUTPUT—UP 12.7% (Week ending May 16), Kwhr 12,684,000,000



Per Cent Change From Previous Year

	May 2	May 9	May 16
Total U. S.	+11.5	+11.9	+12.7
New Eng.	+ 9.8	+ 4.6	+ 9.0
Mid. Atlantic ..	+10.0	+ 6.1	+12.4
Cent. Ind.	+16.0	+16.3	+17.6
West Cent.	+10.6	+14.1	+ 8.9
Southeast	+ 5.9	+ 7.9	+ 8.7
South Cent.	+13.5	+20.5	+14.1
Rocky Mount..	+15.7	+10.0	+ 9.9
Pacific			
NW	+12.6	+16.3	+12.7
SW	+13.1	+11.7	+14.0

Seasonally Adjusted Index 254.5

Week Ago 255.1 Year Ago 225.4

Source: Edison Electric Institute

Preview of this Issue

EVENTS ▶ **Need for more and better public information effort** was stressed at PUAA meeting. Ad and PR executives were told, "You have a dramatic story to tell." Pacific G&E topped the 97 utilities competing for awards by winning a total of nine **(p 56)** . . . United Kingdom's second big A-plant—Chapelcross—was dedicated earlier this month. The Scotland plant will have 184-Mw capacity next year **(p 58)** . . . A surprisingly moderate atomic power construction bill is expected to be passed by both Houses. High-temperature gas-cooled reactor of Philadelphia Electric group may be endangered by proviso for repayment of government's R&D aid, if project isn't constructed **(p 59)** . . . New Jersey strike marked by union's recalcitrance **(p 60).**

ENGINEERING ▶ **The accent is on substations this week.** The five-story package mentioned on our cover tells how: Commonwealth Edison saves time and money using T-towers in industrial substations **(p 66)** . . . Aluminum angles cut the cost of distribution substation bus **(p 62)** . . . Florida P&L uses ground switch protection scheme on distribution substations lacking high-side breakers **(p 70)** . . . Georgia Power develops breaker using expulsion-tube principle to protect transformer banks **(p 68)** . . . Philadelphia Electric's dual-cooling arrangement ups transformer banks' ratings for an emergency **(p 64).**

Politics and Public Power

A PREFERENCE CLAUSE WITH NO EFFECT?

Sen Richard Neuberger (D-Ore.) finally introduced his "Columbia River Development Corporation" bill last week in the Senate without waiting for any co-sponsors. In 1958, he had seven co-sponsors of his bill, but his insistence on a modification in the federal preference clause created opposition among several previous sponsors and federal power advocates.

The new bill, referred to the Senate Public Works Committee, calls for the proposed corporation to:

- Assume utility responsibility for power in its area;
- Issue up to $1.1 billion in revenue bonds for construction for new steam and nuclear plants without Congressional review—but not for hydro plants;
- Enter into joint agreements with other federal agencies (Army Engineers, Bureau of Reclamation) to pay for and operate the power features at authorized new hydro projects; and finally
- Modify the existing Bonneville preference clause so that "no unreasonable concentration of power" in one state could result from the preference provision.

It is this last item on which supporters and possible co-sponsors have stubbed their political toes. Federal preference policy has usually been predicated upon a scarcity of power, on the basis of which it was allocated to cooperatives and public-power agencies. But under one of the provisions of Neuberger's bill the "utility responsibility" clause —no power shortage is permitted to exist, and, in Neuberger's words, "As long as there is no shortage of power, the preference clause has no effect."

PROCUREMENT & PRODUCTS ▶ **Value analysis as a cost-cutting technique** got the spotlight at EEI's recent Purchasing and Stores Committee meeting. Detroit Edison's W. J. Pierce describes the old, but newly-named, technique which, he claims, brought professional status to purchasing **(p 84).**

MANUFACTURERS ▶ **Westinghouse designs an all-purpose metering unit** for metering basic types of single and polyphase distribution circuits . . . Allis-Chalmers has a traveling workshop which it uses to teach motor shop personnel to wind and produce Silco-Flex insulated coils **(p 88).**

NEW EQUIPMENT ▶ **Capacitor equipments which use 50-kvar capacitor units** are now available . . . Adaptable bushings are offered in 15 through 196-kv line . . . Aerial platform is designed for cleaning street lights **(p 95).**

MANAGEMENT ▶ **Peak-load estimates have been shaved since six months ago,** according to EEI's 25th Semi-Annual Electric Power Survey, but peaks are still expected to rise at about 7½% a year through 1962—faster than the double-every-10-years rate. Summer peaks still gaining **(p 103).**

SELLING ▶ **Philadelphia Electric rounds out a street lighting program** in which it replaced 22,000 gas street lights since 1949 **(p 111).**

TRINITY POWER BILLS ANALYZED

The American Enterprise Assn has released a 20-page analysis of the Trinity River Partnership Power Bills (HR-5499 and HR-5521) introduced in the House of Representatives this year. Although the Association claims its analyses are not intended to give conclusions on various bills—only a summary of issues—the report on partnership appears favorable to the Pacific Gas & Electric Co proposal. Copies may be obtained from the Association, 1012 14th Street, NW, Washington, D. C. Price is $1.00 for each copy.

TVA AND WHITE HOUSE-SENATE HOSTILITY

The mounting hostility between the White House and the Senate—evidenced in the bitter Luce and Strauss nominations—may be thrown into sharper focus by the two pieces of TVA-bond legislation which the Senate must soon consider.

These two bills—the one recently passed by the House, and the one introduced by Sen Robert Kerr (D—Okla.)—differ in one very important aspect: The House bill has a TVA-area limitation; the Kerr bill does not.

If the mood of the Senate does not improve between now and early June, when these bills will probably be debated, the area-limitation issue may well prove to be the spark that ignites another White House-Senate explosion, for the President is almost certain to veto any TVA-bond legislation which does not contain an area-limitation clause. This, in turn, will not ameliorate the bitterness felt by some Senators toward him, and will help prolong a fight which the nation can ill afford at a time when a summit conference is a certainty.

Selling commercial air conditioning based on facts is an approach being tried by Portland General Electric Co. A two-man team surveyed stores, restaurants, and offices and amassed a wealth of data on who has cooling equipment and what type, who wants it, and who doesn't and why. **Electrical West, May 1959.**

Safety is a must in our company and helps make it a good place to work. Make sure of safety first. This is among the first impressions of a new employee. It is emphasized through a comprehensive effort which tries to sell safety rather than force it. **W. C. Bremner, Commonwealth Edison Co, EEI Bulletin, February 1959.**

NUCLEAR NOTES

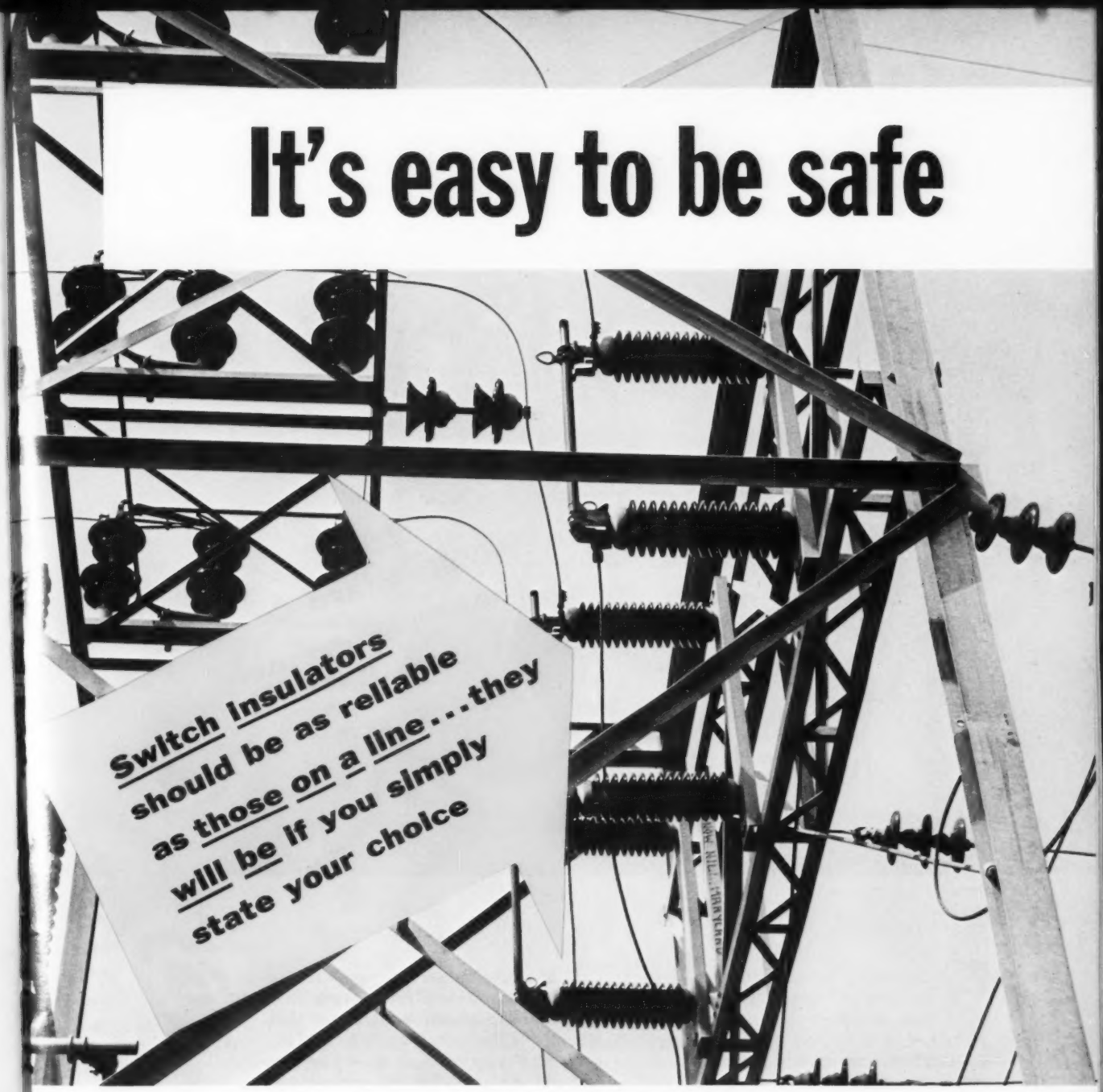
Superheated steam from nuclear power is being produced at the Vallecitos Atomic Laboratory in California. The experiment, called Superheat Advance Demonstration Experiment (SADE), is being conducted in an in-pile demonstration loop in the Vallecitos BWR. Steam from the reactor is superheated using uranium oxide ceramic, a fuel having a high potential for low-cost fuel. **General Electric Co, Schenectady, N. Y.**

Larger core may raise by 2½ times the present output of the Shippingport PWR nuclear plant. Fabrication cost of the 150-Mw core, at $13 million exclusive of uranium charges, is about the same as for the original 60-Mw core. Installation of larger core, urged by Adm Rickover, requires that JAEC confirm tentative $5 million authorization and provision of bigger main unit by Westinghouse and Duquesne Light.

Two basic purposes will be served by AEC's new $4 million Argonne Fuel Fabrication Facility, dedicated May 14 at Argonne's main site southwest of Chicago near Lemont, Ill. It will fabricate plutonium fuel elements for several of the Lab's nuclear reactors. It also will make a variety of test pieces containing plutonium for metallurgical, physical and chemical research. The plutonium fuel elements from the new facility will be loaded into Argonne's Experimental Breeder Reactors I and II and the Experimental Boiling Water Reactor. They also will be fabricated for Zero Power Reactor III in Idaho. **Atomic Energy Commission.**

Engineers on loan from various utilities that own Yankee Atomic Electric Co are now at the Rowe, Mass., site for two-month periods to get first hand knowledge of operating procedures. Yankee officials also are hiring personnel for a number of specialized jobs. Barring delays, the plant will be ready to operate late in 1960. **Western Massachusetts Electric Co.**

It's easy to be safe



It sounds foolish to ask if you would build a major transmission line *and not even know the kind of insulators that are used.*

That line terminates at a station. Insulation reliability is just as important here.

This station contains many switches -- purchased complete with their insulation. *Do you know what kind of insulators?* Isn't it just plain logical that you should? Can an insulator be good enough for a station and still not good enough to trust on a line?

Switchgear manufacturers gladly perform the service of complying with your insulator preference. There is no penalty in cost or trouble. Just state your choice. It's as easy as saying "O-B". Name it and you can have it!

OHIO BRASS COMPANY, MANSFIELD, OHIO

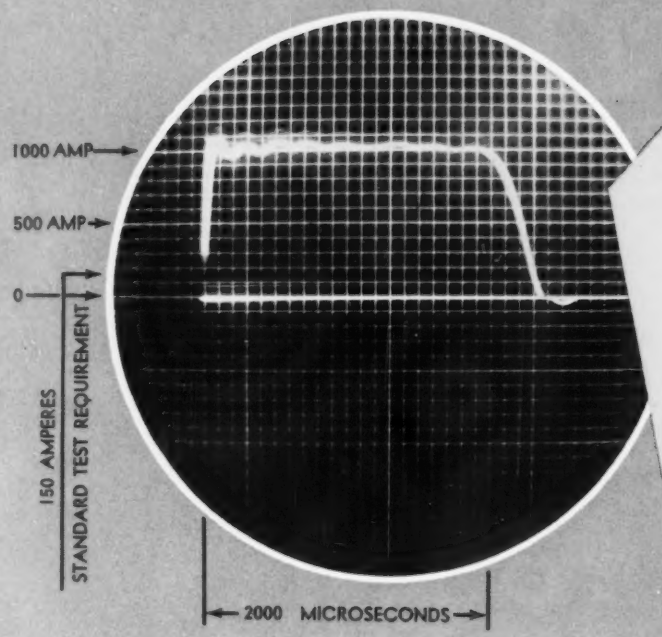
Canadian Ohio Brass Co., Ltd., Niagara Falls, Ont.

Ohio Brass HOLAN

PORCELAIN INSULATORS · LINE HARDWARE · CAPACITORS · LIGHTNING ARRESTERS
BUSHINGS · HOLAN TRUCK-MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES

4928-H1

"Beyond the call of duty"



Thorex arresters exceed by many times standard durability requirements

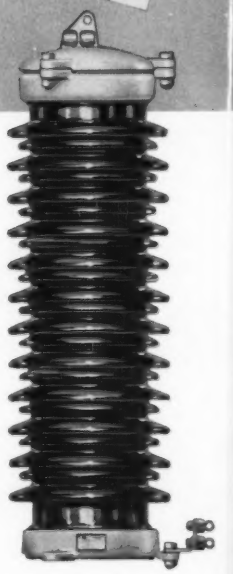
Durability is one of the biggest features of Thorex Dynagap lightning arresters -- a capacity to withstand the heavy, and sometimes unpredictable demands imposed by modern transmission systems.

This characteristic can be measured. ASA Station Class Durability Standards require an arrester to withstand a series of 20 discharges of 150 amperes, having a duration of 2,000 microseconds. These discharges are spaced over a time period of 75 minutes which permits valve block cooling between applications.

Compare the standard with the oscillogram shown here. Station Class Thorex arresters are tested, not at 150 amperes, *but at 1,000 amperes or more!* The O-B impulse generator is set on fast automatic cycling and applies a discharge every 20 seconds, allowing no thermal relief period.

Nearly seven times the required standard current is applied in less than one-tenth the allowable period of time. Because of the cumulative effects of this severe test procedure, it would be difficult to evaluate Thorex performance against standard requirements.

This is the kind of durability you get in Thorex arresters. Durability "far beyond the call of duty." And this is another reason why your stations should be Thorex-equipped.



OHIO BRASS CO., MANSFIELD, OHIO

Ohio Brass (B) HOLAN

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BUSHINGS · HOLAN TRUCK MOUNTED POWER DEVICES AND BODIES · BRONZE VALVES

4928-H2

Many electrical manufacturers would like to have this as their main laboratory -- the testing equipment that is installed in the O-B bushing inspection department.

Every bushing receives the required one-minute withstand and other 60-cycle high potential tests. It is also subjected to both power factor and capacitance checks at 10 kv. Final over-voltage internal ionization test confirms the unusually low noise level of O-B bushings.

Some people may wonder why O-B condenser bushings have made such a remarkable record for performance. This is one of the important parts of the answer -- unequalled facilities *to do our job right!*

Your new station apparatus can be equipped with O-B bushings simply by expressing a preference. It couldn't be easier to get the best.

OHIO BRASS COMPANY, MANSFIELD, OHIO

Ohio Brass

HOLAN

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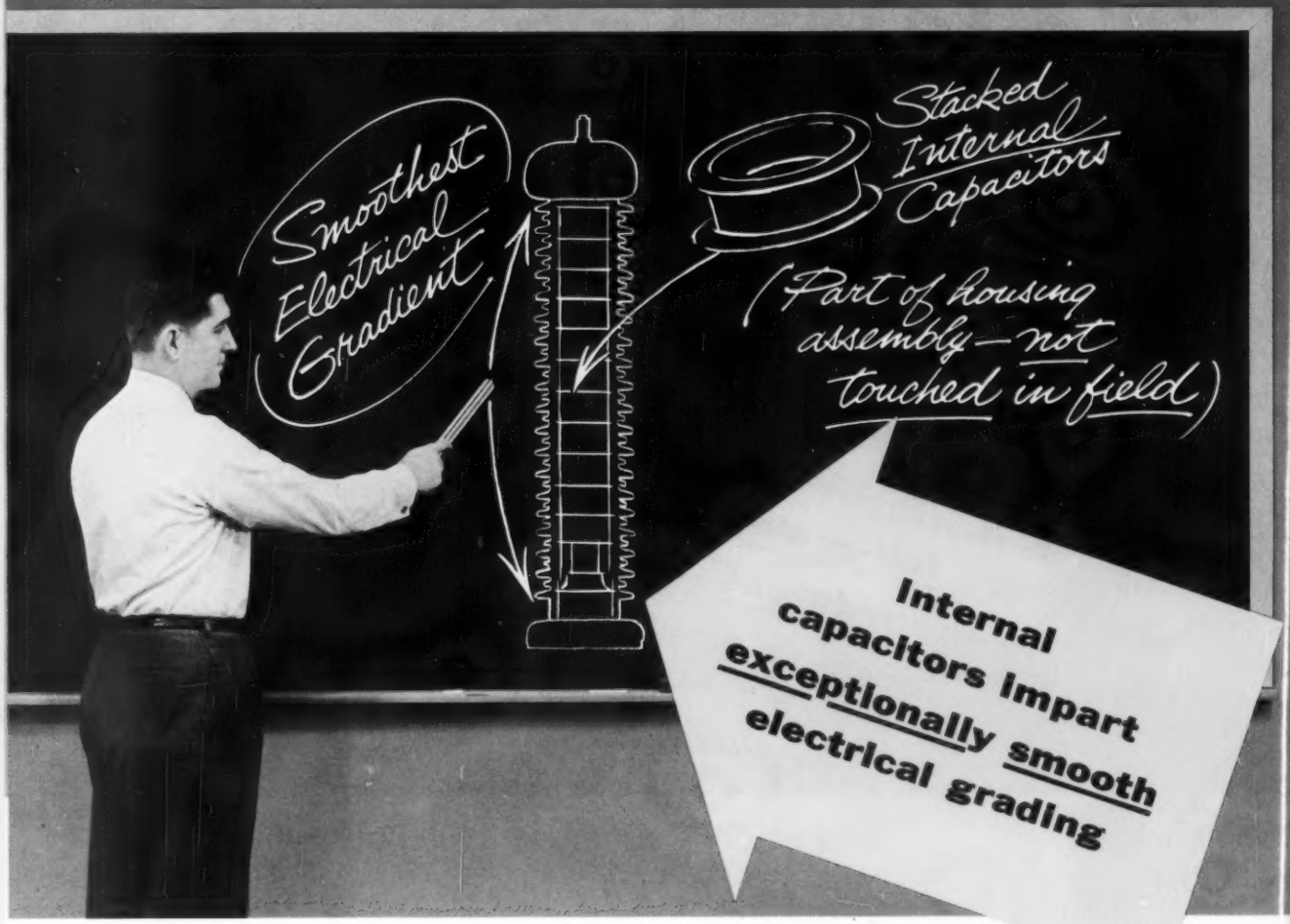
4928-H3

A completely new pothead


Smoothest Electrical Gradient
Stacked Internal Capacitors
(Part of housing assembly—not touched in field)
Internal capacitors impart exceptionally smooth electrical grading

Most novel feature of O-B's new pothead is the effective and ingenious use of internal capacitor grading. From line potential to ground there exists, by virtue of the series-connected capacitors, an exceptionally smooth, long-length voltage-control system. These capacitors are part of the porcelain housing assembly, and are not handled or exposed in the field in the course of terminal make-up.

Not only do the porcelain housings contribute generous external leakage length for operation in contaminated locations, but the full height of the pothead is utilized in the voltage-control system. The capacitance grading method permits periodic surveillance of the internal dielectric, the same as practiced with high voltage condenser bushings.

Every element of this pothead: porcelain, metal parts, capacitors, wound paper components, and all incidentals, are designed by the same engineering force and manufactured in the same plant. This complete coordination is possible only with O-B's broad manufacturing scope.

Final steps in organizing quantity production are now near completion. If you anticipate terminal requirements (presently 115 kv or above) please discuss the matter with your O-B representative. A very interesting new product is about ready for you.

OHIO BRASS COMPANY, MANSFIELD, OHIO

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4928-H4

Power in the making for the Pacific Northwest

400,000 kilowatts will be the initial generating capacity of the Noxon Rapids Hydroelectric Development. Scheduled for completion in early 1960, the dam towers 190 feet above the Clark Fork River bed. Located 38 miles downstream from Thompson Falls, Montana, this new plant of The Washington Water Power Company will nearly double the generating capacity of all ten of the company's present generating plants.

This is but one of the many diversified projects being handled by Ebasco in this country and in many other parts of the world.

To learn how Ebasco can serve your company's needs, send for our brochure "Engineering, Design and Construction Services." Address: Ebasco Services Incorporated, Dept. M, Field Building, 140 South Clark Street, Chicago 3, Ill.

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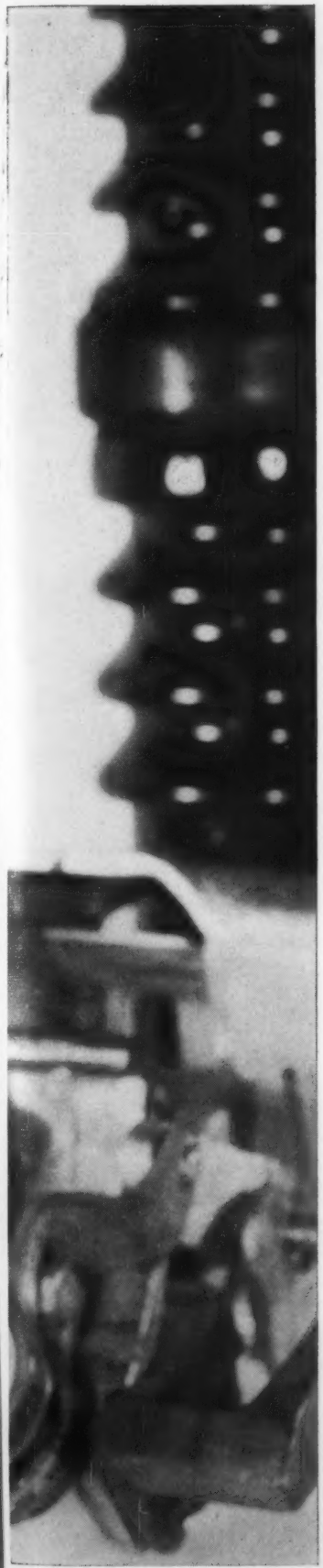
Easily changed fuse cap converts cutout interrupting rating from heavy duty to extra-heavy duty



Another Bonus Value from Westinghouse . . .

HEAVY DUTY OR EXTRA-HEAVY DUTY SERVICE WITH A TWIST OF THE WRIST!

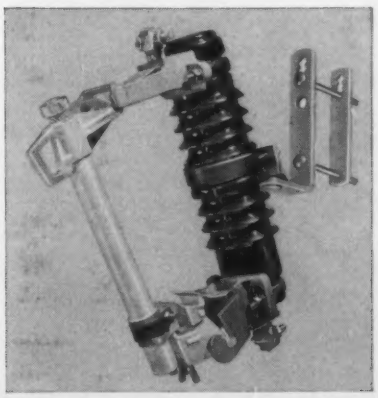
Universal Application—Allows 15% Inventory Reduction

Now . . . *one* Westinghouse cutout for all ratings. Each cutout is shipped with two fuse caps allowing selection of solid cap application for faults up to 5000 amperes and expendable cap for up to full rating of 10,000 amperes. This wide range of application can reduce your inventory requirements by 15% . . . simplify stocking records. And, you get these high current ratings at the *same cost* as the previous 3000-amp I. C. normal duty cutout!

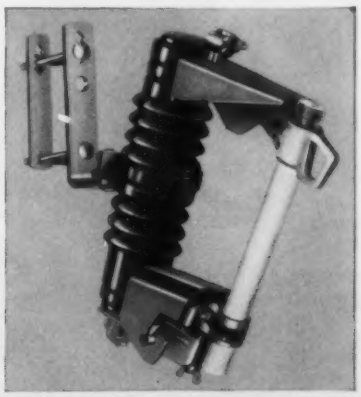
High Power Lab Testing

To insure the complete electrical capability of this new design, Westinghouse carried out controlled current tests to duplicate the toughest duty the unit would ever encounter. Batteries of tests on the new DX and CDX cutouts at the Westinghouse High Power Lab included: temperature rise, radio influence, impulse, wet and dry withstand, vibration and shock tests. The result: A well balanced design with bonus capacity to handle a fault up to 150% of rated NEMA standards! Ask your Westinghouse sales engineer for complete information about the new DX and CDX cutouts and a demonstration right in your own office. Or, for complete information, write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pennsylvania.

J-60969



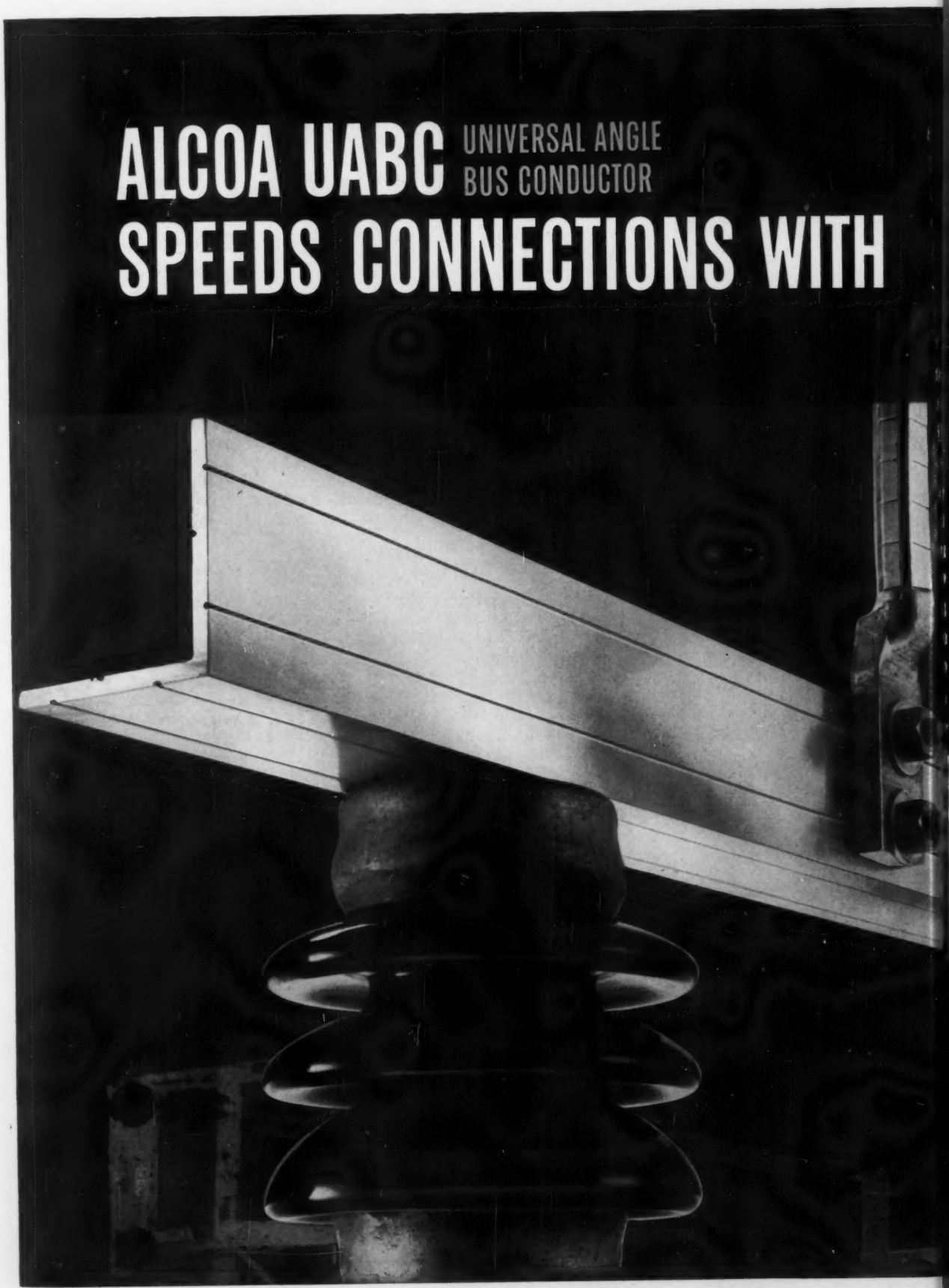
CDX CUTOUT features bronze upper and lower current-carrying parts for use in highly corrosive atmospheres . . . especially coastal areas where equipment is subjected to salt spray.



DX CUTOUT, with its steel sleet hood, one-piece porcelain, birdproofing, shockproofing, is especially designed to give years of reliable performance.

YOU CAN BE SURE...IF IT'S Westinghouse

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS


ALCOA UABC UNIVERSAL ANGLE BUS CONDUCTOR
SPEEDS CONNECTIONS WITH

NEW LOW-COST DESIGN FOR SMALLER SIZES OF SUBSTATION BUS CONDUCTOR ADAPTS TO NORMAL CABLE LUG CONNECTORS

Here is the latest development by Alcoa to help you save money. Universal Angle Bus Conductor —UABC.

This aluminum extruded L-shape provides a new low-cost type of bus conductor. Designed primarily for use in distribution-type substations, it can also be used advantageously in substations for subtransmission voltages and primary distribution voltages.

Alcoa® Aluminum UABC offers new convenience features that speed installation. Extruded grooves on the inside and outside of each leg locate the center points for drilling holes.

With Alcoa UABC, fewer and less expensive fittings are needed. Normally, the large number of fittings required cost more than the bus. In contrast, Alcoa UABC can be installed simply with bolts. Simple terminal connectors are used to make taps or flexible connections.

Years of Alcoa research and development, plus months of field testing, stand behind this new conductor. A good balance of mechanical, physical and electrical characteristics of this new conductor is incorporated by its shape and Alcoa No. 2 EC bus alloy.

Alcoa Universal Angle Bus Conductor is available *now* in the 3¼ x 3¼ x ¼-in. size in standard 25-ft lengths and is rated at 1,300 amperes. In most cases, the new conductor involves only one UABC per phase. For more information, call Alcoa today. Or write, Aluminum Company of America, 2110-F Alcoa Building, Pittsburgh 19, Pennsylvania.

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ALUMINUM COMPANY OF AMERICA

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50 KVA — 2400 V. — NO TAPS															
CONVENTIONAL 50 KVA								STANDARD 50 KVA SWA							
LOAD KVA	CORE LOSS	COPPER LOSS	TOTAL LOSS	% REG. 0.9 PF	%IZ	%IR	%IX	LOAD KVA	CORE LOSS	COPPER LOSS	TOTAL LOSS	% REG. 0.9 PF	%IZ	%IR	%IX
5								5							
10	170	23	193	.36	.42	.23	.35	10	170	17	187	.25	.25	.17	.22
20	"	92	262	.73	.84	.46	.76	20	"	67	237	.50	.56	.34	.45
25	"	144	314	.91	1.06	.58	.88	25	"	105	275	.62	.70	.42	.56
30	"	207	377	1.09	1.26	.69	1.06	30	"	150	325	.75	.84	.50	.67
40	"	367	537	1.45	1.68	.92	1.41	40	"	267	437	1.00	1.12	.67	.90
50	"	575	745	1.82	2.1	1.15	1.76	50	"	418	588	1.24	1.4	.83	1.12
60	"	828	998	2.18	2.52	1.38	2.11	60	"	602	772	1.49	1.68	1.01	1.35
70	"	1125	1295	2.54	2.94	1.61	2.46	70	"	820	990	1.74	1.96	1.17	1.57
75	"	1295	1465	2.72	3.16	1.73	2.64	75	"	940	1110	1.86	2.09	1.25	1.68
80	"	1470	1640	2.90	3.37	1.84	2.82	80	"	1070	1240	1.99	2.25	1.34	1.80
90	"	1865	2035	3.26	3.78	2.07	3.16	90	"	1355	1525	2.24	2.52	1.51	2.02
100	"	2300	2470	3.63	4.21	2.3	3.52	100	"	1675	1845	2.48	2.80	1.68	2.24
110	"	2770	2940	4.00	4.63	2.53	3.87	110	"	2020	2190	2.73	3.06	1.84	2.46
120	"	3300	3470	4.35	5.06	2.76	4.22	120	"	2400	2570	2.98	3.35	2.0	2.69

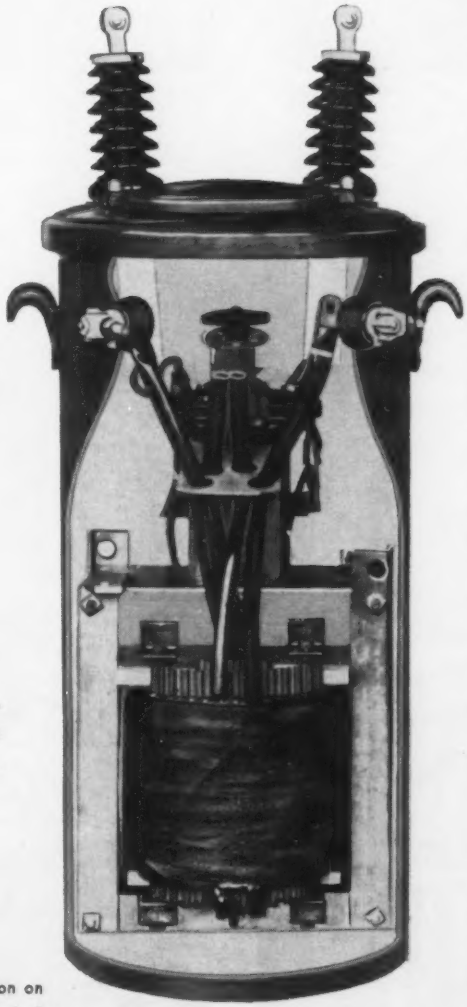
If you'd like a set of comparison charts like this on THE COMPLETE LINE of Standard SWA Distribution Transformers, drop a note to Standard. We'll send them by return mail.

Most utilities can only handle a maximum of 3% regulation without trouble. The Standard Transformer SWA units make this possible. These dramatic units slash copper losses 30%; provide lower impedance; give low temperature rise without excessive voltage drops; and produce savings sufficient to pay for the transformers!

Check the table above and then write for a complete set. Prove to yourself what the Standard SWA can do on your system.

on investment
bution Transformers

WRITE FOR Standard Bulletin S-401-C. It gives basic facts on the dramatic, new, SWA Series.



BUSHINGS — Wet-process for high strength. Designed to prevent surge flashover inside tank. High voltage bushings are corona-free at normal voltages. Raised mounting bosses shed water.

COVER—Liberal opening in hand-hole. Stainless steel clamping band with reusable nitrile rubber gaskets. Tapered cover sheds water easily.

TAP CHANGER — Easy-to-reach grip above oil. Spring loaded switch assures positive positioning.

POSIT-LOCK TERMINALS — Keyed to porcelain and porcelain keyed to tank to prevent turning. Receive either aluminum or copper conductors. Meet all new NEMA standards.

COIL—Precision wound with Formvar wire. Insulation exceeds all NEMA requirements. Lo-Temp design assures overload capacity at no extra cost. Coils braced to withstand external short circuit.

CORE-COIL ASSEMBLY—Core clamp frame keyed to tank bottom to prevent shifting.

WOUND CORE — Cold rolled grain-oriented silicon steel. Design produces reduction in exciting current, tank size and weight.

OIL—High dielectric strength. Inhibited or regular as required by the user.

FINISH—Primer and two finish coats. Salt spray tested. Outstanding durability under the most severe operating conditions.

TANK—Corrosive parts reduced to a minimum. Tested and fabricated in accordance with NEMA standards.

40th ANNIVERSARY — 40 years of concentration on transformer design exclusively

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Standard Transformer CO.

WARREN, OHIO

"WHEREVER THERE IS POWER"

REPRESENTATIVES IN PRINCIPAL CITIES

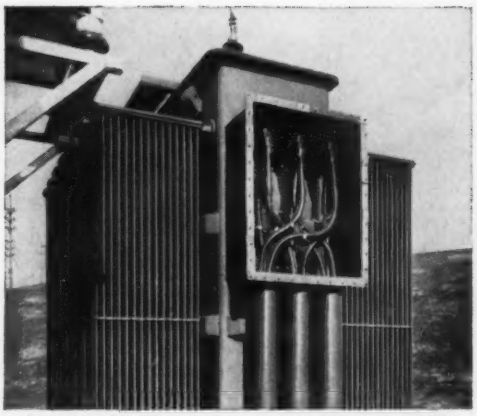
Installed in underground ducts, Paranite Super Pararite-Paraprene® network cable services a modern electronic computer installation.

Paranite Super Pararite-Parasyn cables carry primary power between transformers and switchgear control panels in an ore reduction plant.

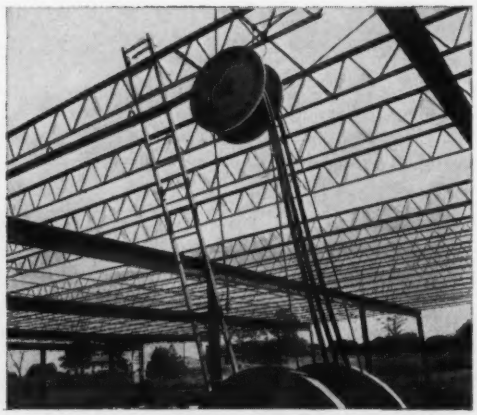
Across the nation for trouble-free installations...

PARANITE®

"IF IT'S PARANITE IT'S RIGHT"®



Paranite Super Pararite-Paraprene cable serves as the primary transformer feeder in a new municipal water pumping station.



Overhead duct installation of Paranite Super Pararite-Parasyn® (PVC) serves as a secondary feeder cable in a manufacturing plant.

The consistent selection and performance of Paranite cables from 600 volt network through 23,000 volt power cables mark them as products of close quality control. These Super Pararite-Paraprene and Super Pararite-Parasyn (PVC) cables illustrated above, indicate the versatility, national availability and proven trouble-free performance of Paranite installations.

PARANITE WIRE AND CABLE DIVISION

Essex Wire Corporation, Fort Wayne, Indiana

MANUFACTURING PLANTS: Marion, Ind.; Jonesboro, Ind.; Tiffin, Ohio; Birmingham, Ala.; Anaheim, Calif. • Sales Offices in All Principal Cities

Which speaker is making the sound? In echoless chamber at Bell Labs, Robert Hanson measures test subject's ability to localize sounds — observes how two ears operate in partnership. This and other tests may point the way to better telephone instruments.

In listening to stereophonic music, how is it that our ears and brain construct a picture of the entire orchestra with but two samples (the sounds from two speakers) to work with?

How is it that our ears and brain are able to pinpoint *one* voice in a roomful of talkers—to listen to it alone and ignore the rest?

What makes *two* ears better than one?

Bell Telephone Laboratories scientists are searching for the answers. For in finding them, better telephone instruments and better ways of transmitting sound will surely result.

Our hearing performs feats that no electronic system can yet duplicate. How? Laboratories scientists believe the secret lies in the way our two ears function in partnership and in the way our neural network connects them with our brain. *The problem:* to discover what functions the network performs and to see whether electronic duplication might enhance understanding.

The work is under way. Electronic circuits that simulate the operation of nerve cells have already been created—and conceptual models of the neural network are being constructed.

Alexander Graham Bell's interest in deafness and hearing led to the invention of the telephone. Bell Laboratories' current explorations in binaural sound may well lead to important new advances in the transmission of speech and music.

BELL TELEPHONE LABORATORIES
World center of communications research and development

For the most DEPENDABLE GUY

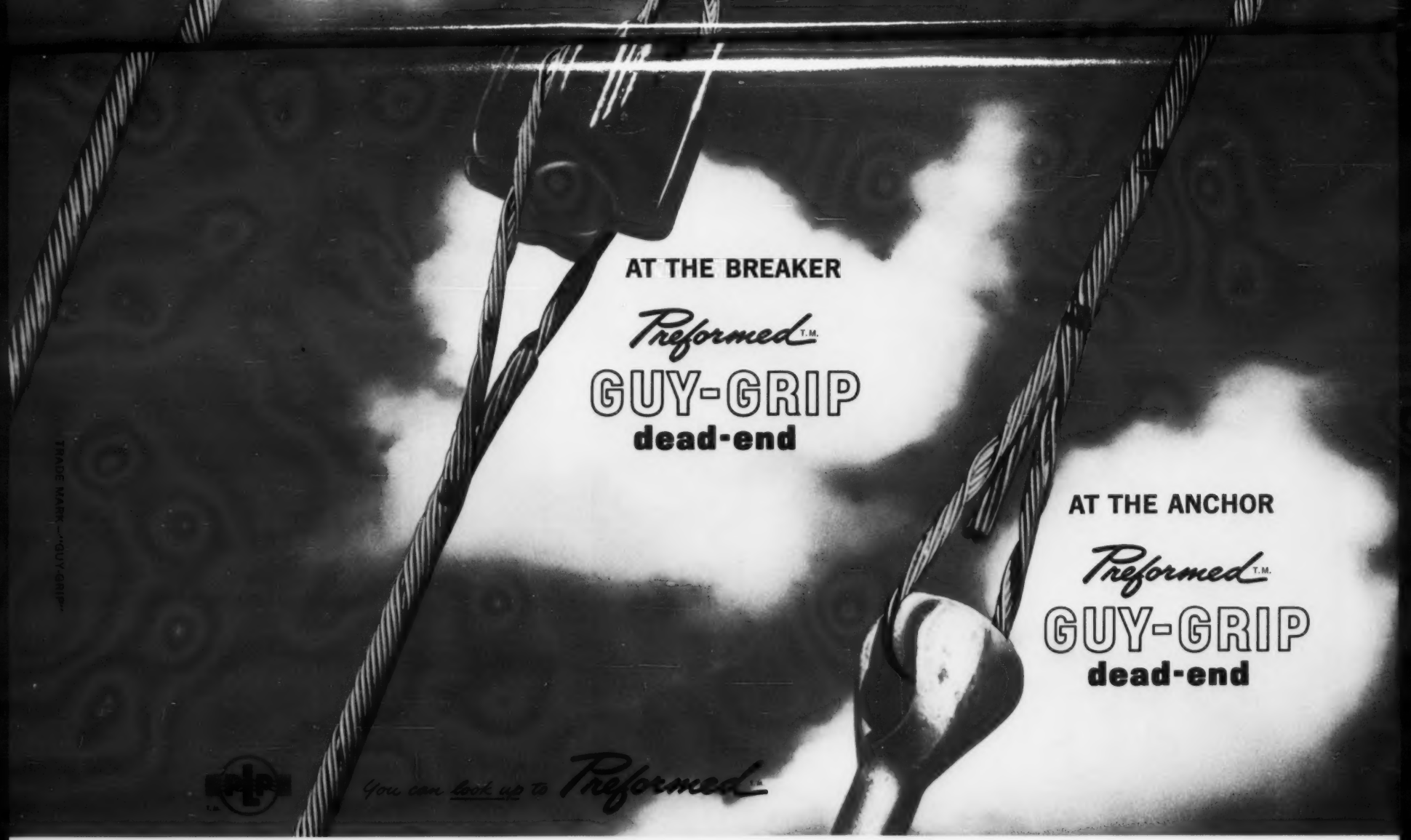
AT THE TOP

Preformed T.M.

GUY-GRIP

dead-end

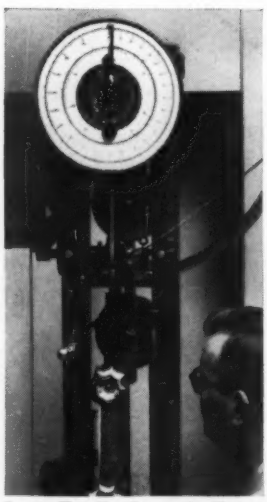
PATENTED—U.S. PATENT NUMBER 3,490,733



Write for the Preformed
Booklet-of-the-Month
"THE GOOD GUY"

PREFORMED LINE PRODUCTS CO.
DEPT. GG 2
5349 St. Clair Avenue · Cleveland 3, Ohio

J-M No. 55 Cable Fireproofing Tape helps contain blowouts—isolate trouble



Scott Tensile Strength Tester proves J-M No. 55 Cable Fireproofing Tape maintains its high strength even after burnout.

Reduce the danger of arc multiplying your troubles in the event of cable failure. Repeated tests prove Johns-Manville No. 55 Tape helps contain arc and splash . . . and retains substantial strength even after being burnt out!

Leading public utilities have chosen J-M No. 55 for its long-range economy plus its dependability. In addition to exceeding their protection requirements, it saves time and money because it costs less to apply. It goes on faster because it's applied *dry*, wraps easily even in confined spaces.

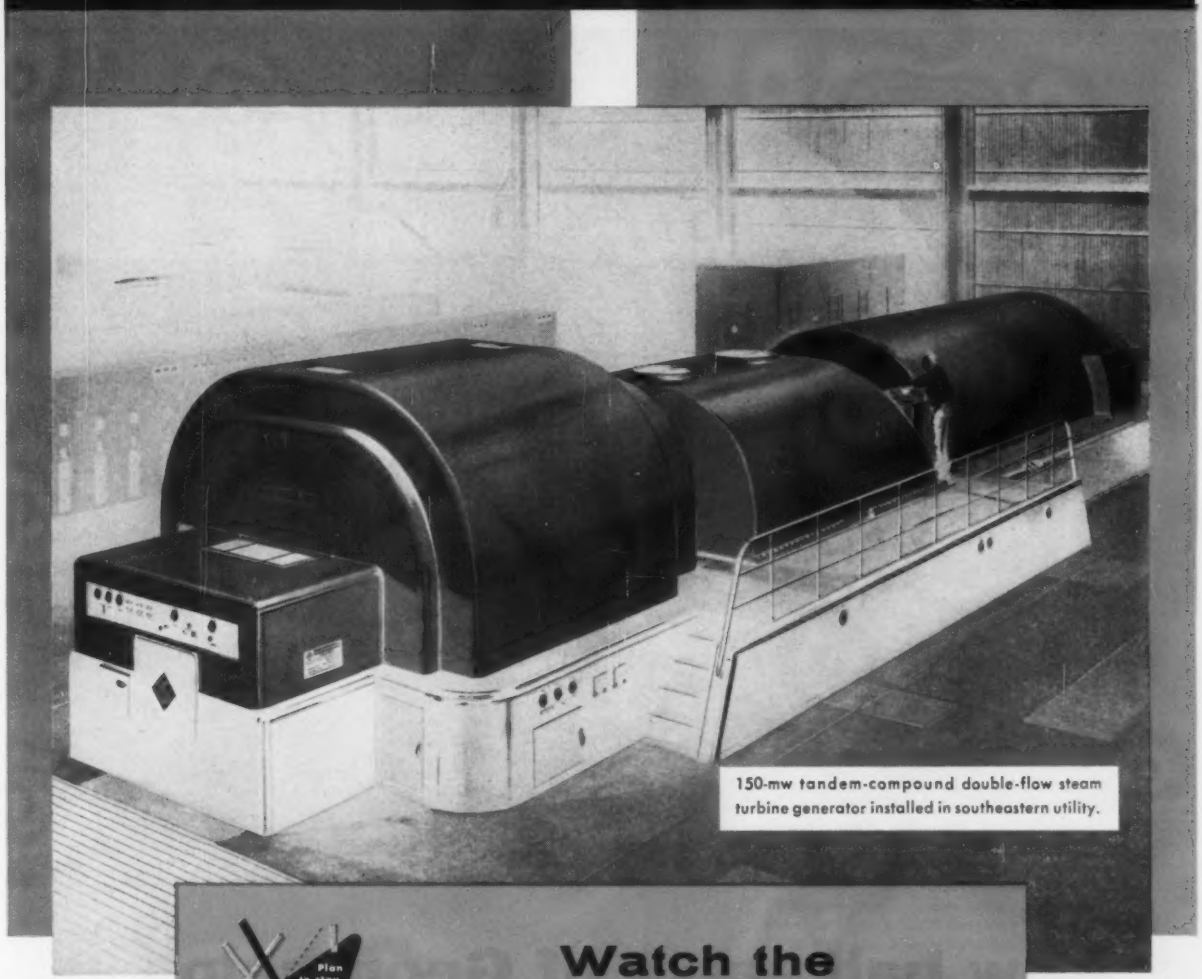
J-M No. 55 protects cables for years under manhole conditions because of top quality asbestos construction and thorough impregnation with silicone. Produced by J-M in an economical thickness, it is high in water repellence, low in water absorption . . . resistant to flame, heat, oil, fungus and mold . . . nonsagging . . . abrasive resistant. The selvaged edges keep ground water out . . . and threads cannot pull out.

For complete details, and test data on J-M No. 55 Cable Fireproofing Tape, write for new brochure TX-6A. Address, Johns-Manville, Box 14, New York 16, N. Y. In Canada: Port Credit, Ontario.

JOHNS-MANVILLE

JOHNS-MANVILLE JM PRODUCTS

ALLIS-CHALMERS modern line for '59



150-mw tandem-compound double-flow steam turbine generator installed in southeastern utility.

Plan to stay ahead... MODERNIZE!

Watch the Modern Generation!

IT's bigger — stronger — better looking — can do more! And most important to you, we're describing Allis-Chalmers equipment for modern power generation . . . ready to serve you.

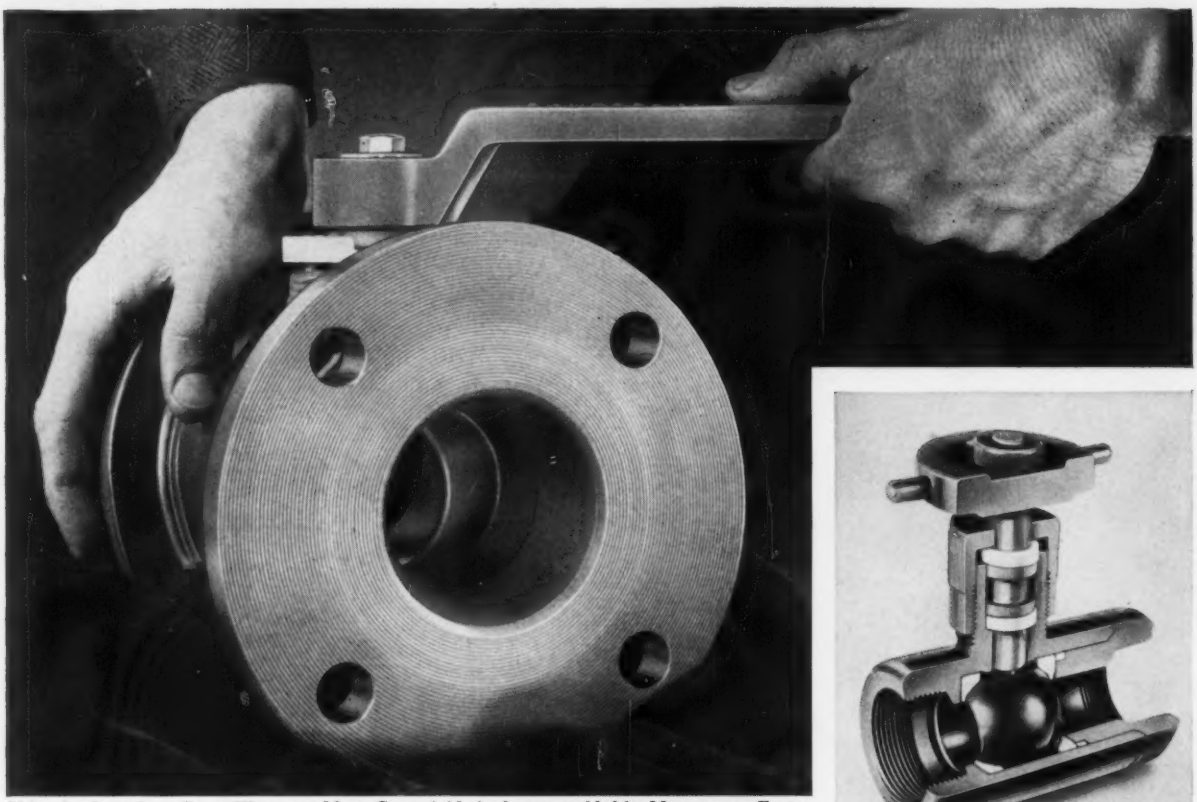
This "generation" was born of Allis-Chalmers engineering and development, including such important advancements as supercharged cooling of generators, close-coupling of steam turbines, welding of condenser tubes, and low silhouette station auxiliary switchgear.

Now this "Modern Generation" is ready to go to work for you. Contact your nearby A-C office or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS A-C A-5987-E

News about

B.F.Goodrich Chemical *raw materials*



Valves by Jamesbury Corp., Worcester, Mass. Geon rigid vinyl parts molded by Mannesman-Easton Plastic Products, Inc., Easton, Pa. Valves in sizes from 1/2" to 4", shown in large photograph, are rated at 150 psi to 100 F. and at 50 psi to 130 F. They can be remote operated. B.F.Goodrich Chemical Company supplies the Geon rigid vinyl material only.

New ball valve of Geon helps piping systems fight corrosion

Thousands of test cycles with this new valve made from Geon rigid vinyl have proved the effectiveness of its seal, either at full pressure or vacuum. Since it is made entirely of Geon except for seats and seals, it offers pipe users another weapon for the battle against corrosion. Geon offers superior resistance to oils, acids, alkalies and most chemicals.

In addition, rigid Geon weighs less than metal. Shipping weights are lower, installation is easier. These valves can be obtained with threaded ends, weld ends, or flanges. They are self-compensating for changes in pressure or temperature. There is no problem of galling or seizure. No lubrication is needed.

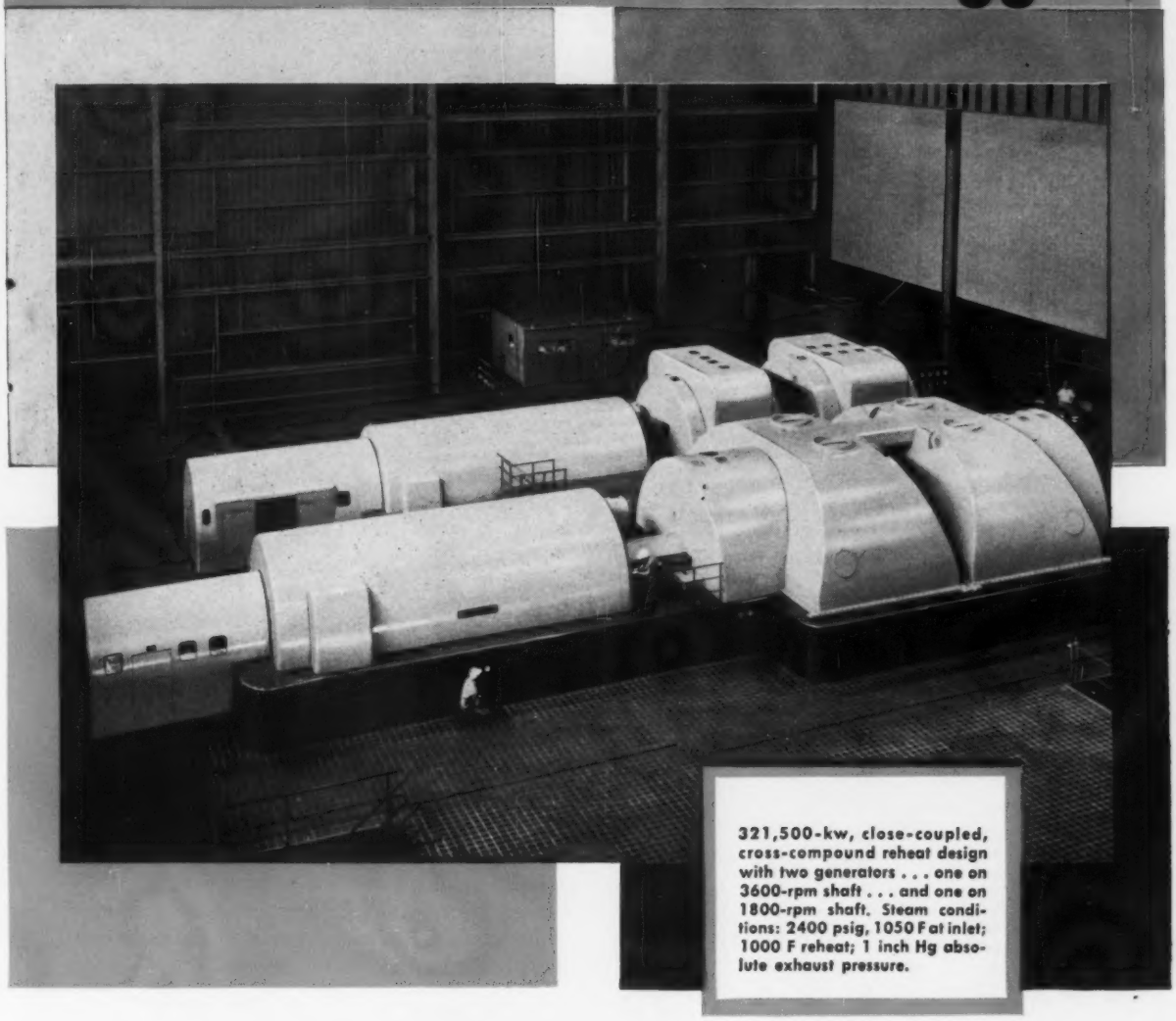
Geon offers remarkably varied opportunities for products that open new markets or improve present applications. In rigid form it is being used for pipe, window frames and ductwork . . . in other forms for weatherstrip, wall coverings, foam products, or coatings for metal, paper or textiles. One member of the Geon family can surely help you make a better product. Write for information to Dept. AT-4, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

B.F.Goodrich Chemical Company
a division of The B.F.Goodrich Company

B.F.Goodrich

GEON polyvinyl materials • HYCAR rubber and latex
GOOD-RITE chemicals and plasticizers • HARMON colors

ALLIS-CHALMERS modern line for '59



321,500-kw, close-coupled, cross-compound reheat design with two generators . . . one on 3600-rpm shaft . . . and one on 1800-rpm shaft. Steam conditions: 2400 psig, 1050 F at inlet; 1000 F reheat; 1 inch Hg absolute exhaust pressure.

Detroit Edison's new 321,500-kw machine goes on the line

River Rouge Unit 3 increases the capacity of the Detroit Edison system to 3¼ million kilowatts — double its capacity of 10 years ago.

In size, in design, this steam turbine-generator unit was the beginning of a new era in power generation.

Of special interest are the record size 46-inch exhaust blades; and the close-coupled arrangement with the crossunder piping located above the foundation which made it possible to build to compact over-all dimensions.

For an interesting discussion of this turbine, see ASME paper 58-SA-22 . . . available through your nearby A-C office or Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin.

Plan to stay ahead... MODERNIZE!

ALLIS-CHALMERS

A-5938-E

Now...a *NEW* overhead ground wire

ALUMOWELD™

Aluminum-Covered Steel Wire

Exclusive features—

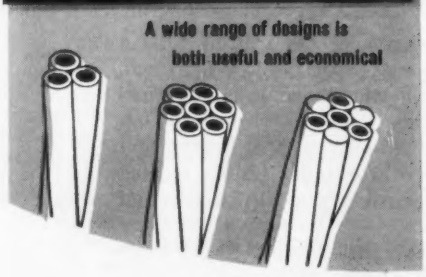
a **thick cladding** of aluminum
a controlled **atomic weld**

Give your transmission lines permanent protection with the new light-weight, low-cost Alumoweld Overhead Ground Wire—the only aluminum-covered steel wire with a thick cladding of aluminum and the only one made by the controlled atomic-weld process.

Not only does Alumoweld have the strength of steel wire, but because of its 25% by area aluminum covering, it offers the added advantages of much higher conductivity and far greater service life. In fact, Alumoweld has corrosion resistance equal to solid aluminum wire, has one third the conductance, and eight times the strength.

In Alumoweld Overhead Ground Wire, you get three important benefits. (1) Its thick aluminum covering permanently protects the high-strength steel core against corrosion. (2) The electrical conductance is excellent for relaying and for discharging lightning and transient currents to ground. And, (3) Alumoweld's high strength permits stringing for ample mid-span clearance.

For more information on Alumoweld, write today for Engineering Bulletin E.D. 3000.



ALUMOWELD

COPPERWELD STEEL COMPANY
WIRE AND CABLE DIVISION Glassport, Pa.
For Export: COPPERWELD STEEL INTERNATIONAL COMPANY, New York

CA59-5

You get over 60% expansion into solid earth with this CHANCE 8-Way Expanding Anchor

It's a fact! Sixty three per cent of the Chance 88135 Anchor, shown above in reduced size, expands into solid, undisturbed earth. All Chance 8-Ways give similar expansion—develop all-around holding power. The eight rib-reinforced blades expand to form a square, with no wasted space between blades. Holding power is distributed over a wide area.

Chance 8-Ways are now packed in extra high-strength, color-coded cartons for better storage and handling.

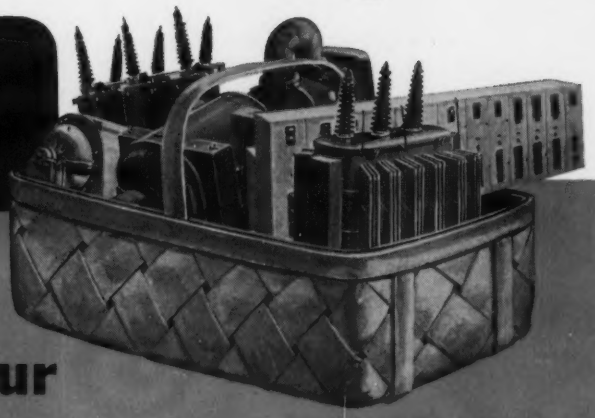
Build lines to STAY with the CHANCE 8-WAY

A. B. CHANCE COMPANY

CENTRALIA, MISSOURI A. B. Chance Co. of Canada, Ltd., Toronto

CA59-5

Is it wise to buy your Auxiliary Motors by the "Market-Basket" system?



It pays to get your AUXILIARY MOTORS from the people who build them best!

CONSIDER THIS before you select your important auxiliaries—*who builds the best powerhouse motors?* . . . who has a solid reputation of thoroughly proving their motors before offering them to buyers?

Ask your engineers and operating men. They are thoroughly familiar with design and construction features that provide long life and trouble-free operation. Ask them if "market-basket" buying provides the *best* units . . . if "unified responsibility" guarantees the *best* auxiliary drives.

Elliott introduced the first *really* outdoor motor which subsequently led to an entirely new NEMA classification—the "weather-protected" motor. Elliott was first to produce "super-quiet" large motors and functional Fabri-Steel frames. Elliott has persistently utilized new insulation materials and fabrication methods which have achieved astonishing records of 20, 30, and 40 years of service. Elliott built the first large 2-pole motor in 1916, has consistently led in their development, and has built the largest ever constructed.

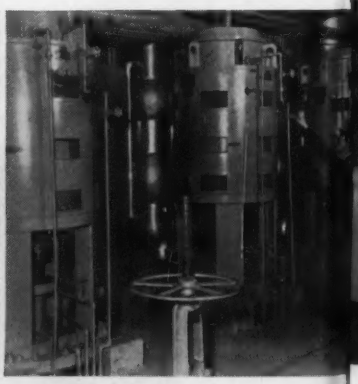
Elliott's unmatched product quality and performance is due to unremitting research for better materials and designs . . . thorough testing of all equipment and components before placing them on the market . . . modern facilities and equipment . . . many years of engineering and manufacturing "know-how" and craftsmanship born of experience.

There's simply no substitute for the benefits which you receive from Elliott's superior design and good workmanship . . . and that's why it pays to do business with Elliott.

ELLIOTT Company
RIDGWAY PLANT • RIDGWAY, PA.

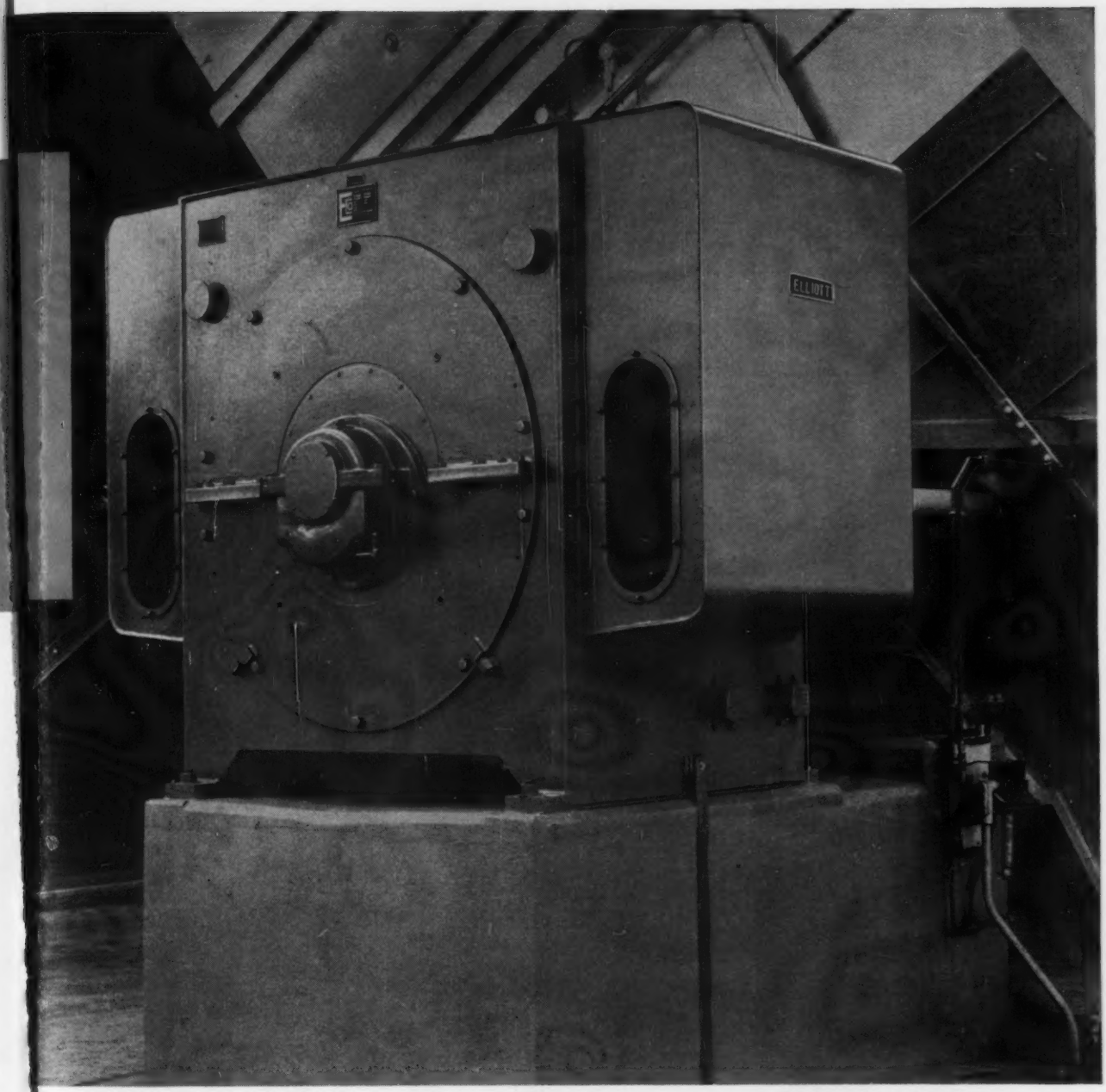
Specialists in large motors for over 50 years. Here are typical examples.

CIRCULATING-WATER PUMP MOTOR

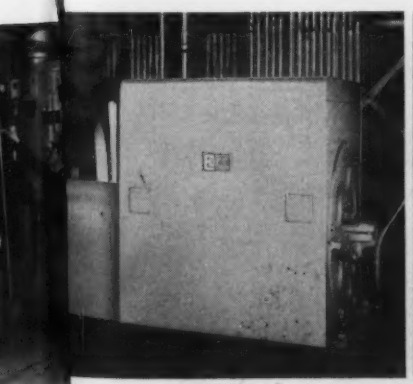


CONDENSATE PUMP MOTOR

R9-3

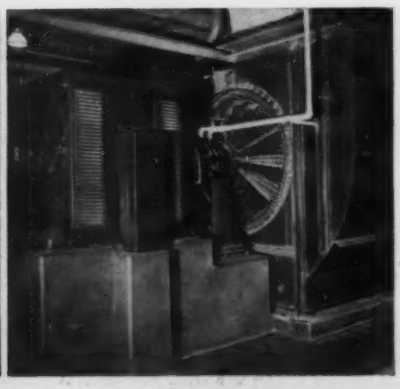


INDUCED-DRAFT FAN MOTOR



PULVERIZER DRIVE MOTOR

BOILER-FEED PUMP MOTOR

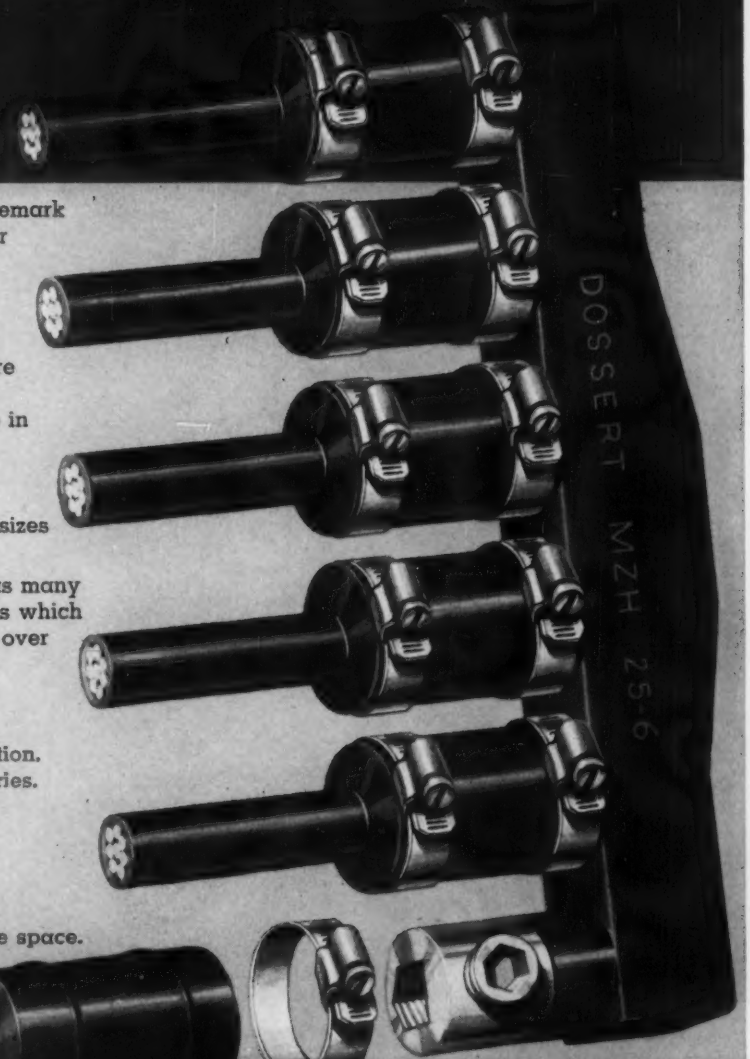


FORCED-DRAFT FAN MOTOR

DOSSERT MICON*

(Tapeless Underground Connector)

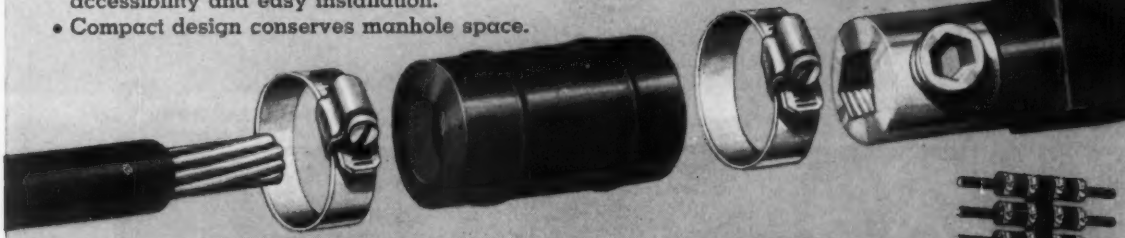
More COMPACT
More RELIABLE
LOWER in COST



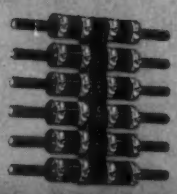
MICON is a Dossert Mfg. Corp. trademark for a tapeless underground connector especially designed for residential and industrial underground distribution systems. This brand of connector is fully insulated for joining up to 8 electrical cables where watertightness must be insured. MICON tapeless connector is simple in concept and well proven principles have been used in its design. No extra components are needed to accommodate a wide range of cable sizes in any outlet position.

MICON brand tapeless connector has many outstanding features and advantages which constitute a substantial improvement over older style and competitive fittings. The most important ones are:

- Lower cost of complete fitting.
- Less field time required for installation.
- Wide cable range without accessories.
- No plastic parts to crack or chip.
- No extra bushings required to fit different insulations.
- All parts are designed for easy accessibility and easy installation.
- Compact design conserves manhole space.



Dossert MICON brand tapeless Crab-type Connector is especially designed for joining up to 12 electrical cables. This connector is an original Dossert design and adheres to the same principle as the tapeless type. Write for special catalog.



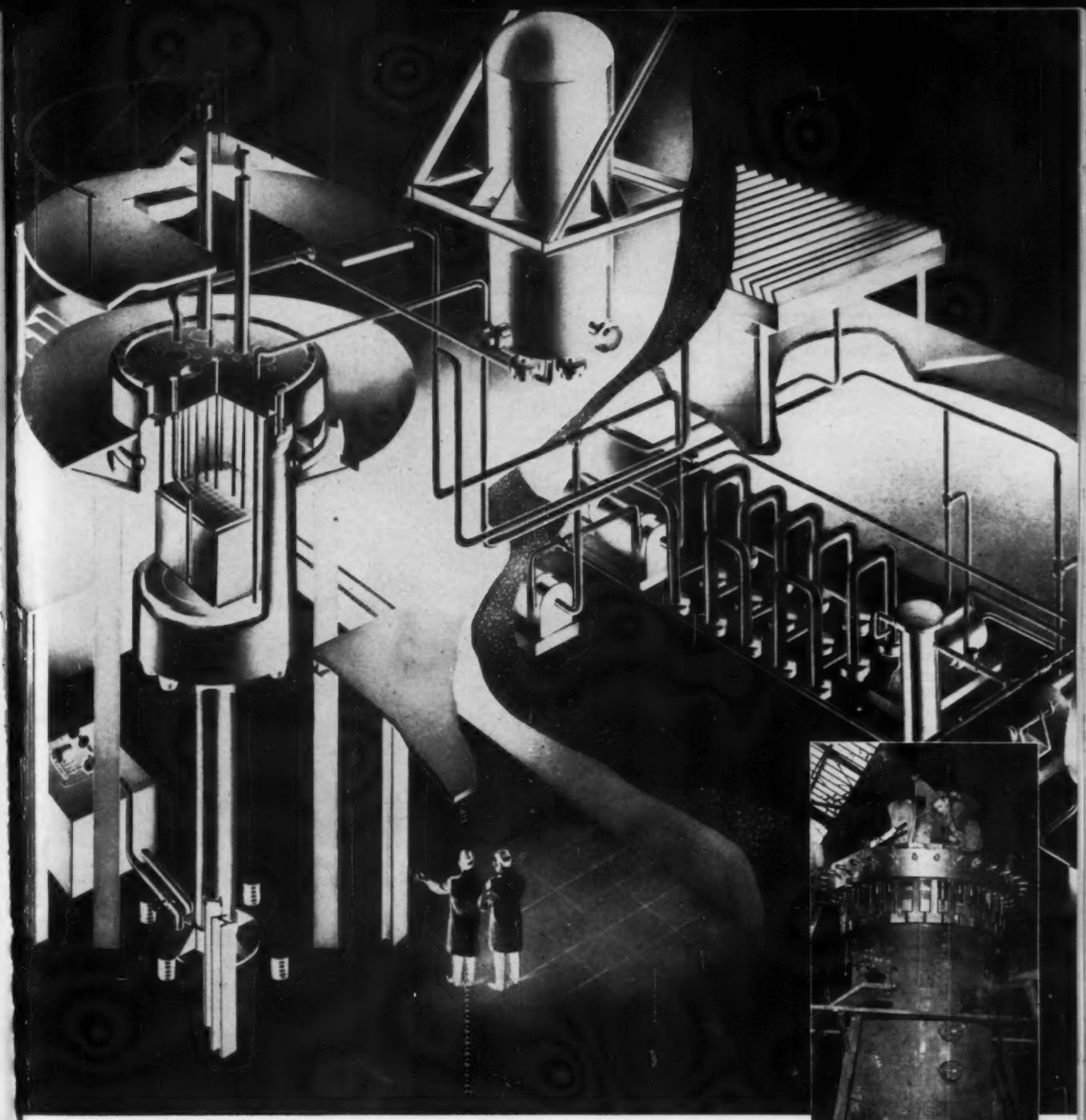
*Pat. Pend. Reg. Trade Mark applied for

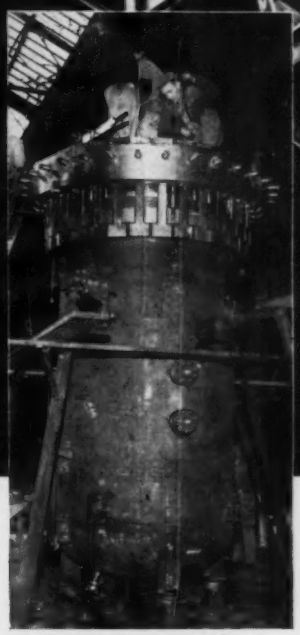
Request also complete UNDERGROUND CATALOG UG 53-1

50

DOSSERT MFG. CORP.

249 Huron Street, Brooklyn, New York





The Proof Test Reactor Pressure Vessel, with quick-opening closure, in Kellogg's Jersey City plant just prior to shipment.

FIRST EVER BUILT

—this high-temperature nuclear test reactor was developed by Knolls Atomic Power Laboratory to confirm design data for reactor cores of the submarine Triton. Vital core components and instrumentation are housed in a 32½-ton stainless steel pressure vessel. Required to withstand 550 F., 1,500 psi, this vessel and its novel, quick-opening closure were designed and fabricated for KAPL by The M. W. Kellogg Company.

Additional examples of Kellogg's ability to design and fabricate nuclear equipment to the most exacting standards include the primary coolant stainless piping for two other nuclear plants. Kellogg is also designing and fabricating heat exchangers for still another nuclear plant. Kellogg's Fabricated Products Sales Division welcomes inquiries for the design and fabrication of nuclear equipment.

THE M. W. KELLOGG COMPANY, 711 THIRD AVENUE, NEW YORK 17, N. Y.

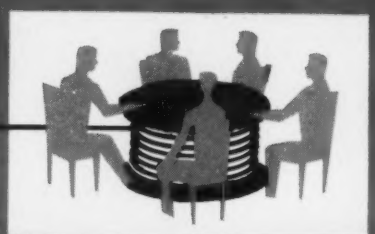
A SUBSIDIARY OF PULLMAN INCORPORATED

The Canadian Kellogg Company Limited, Toronto • Kellogg International Corp., London • Kellogg Pan American Corp., Buenos Aires Societe Kellogg, Paris • Companhia Kellogg Brasileira, Rio de Janeiro • Companía Kellogg de Venezuela, Caracas

M KELLOGG W

WIRE AND CABLE ROUND TABLE

DU PONT



You have asked . . .

Q: Do you have any more dope on your weather-resistant nylon?

A: Yes. Tree-wire samples jacketed with ZYTEL 37X still look good after 7,000 hours in the Weather-O-Meter (unfiltered arc). Samples aged outdoors in Delaware, Florida and Arizona for one year are still, of course, in fine shape.

Q: What ALATHON do you specify for power-cable insulation in your own Du Pont plants?

A: ALATHON 3B, because of its high molecular weight. Besides offering outstanding electrical properties, it gives the finished cable a definite advantage in a higher softening point and better cut-through resistance. Also, the higher molecular weight means the insulation will have better environmental stress-crack resistance. Of course, this is not as serious a problem in primary insulation as in jackets. Yet there is always the chance of encountering cracking agents in pothead filling compounds, in jute fillers, and in the general environment of industrial areas.

Q: How does electromechanical stress cracking differ from environmental stress cracking?

A: In the case of environmental stress cracking, a combination of mechanical stress and a chemical environment are necessary to cause cracking in some polyethylenes. The electromechanical cracking is caused by a combination of mechanical stress and corona. In both cases, ALATHON 3B, NC-10 excels because of its molecular structure.

Du Pont does not manufacture wire and cable, but supplies thermoplastic resins for insulation and jacketing.

At the U. S. Naval Base, Norfork, Va., 61,000 feet of underground cable jacketed with ALATHON will increase electrical facilities by 40,000 KVA. The E. C. Ernst Company, Washington, D. C., was in charge of all installation.

Complete corrosion protection needed— Roebling chose Du Pont ALATHON®

polyethylene resin

The land around the Norfolk Naval Base area is just a few feet above sea level. So when the Navy decided to install eleven miles of underground cable, they needed an outer jacket to protect the lead sheath. The John A. Roebling's Sons Corporation, of Trenton, N. J., chose a jacket of ALATHON 4, BK 30, for their cable. On top of being unaffected by water, this jacket of ALATHON resists soil corrosives, and withstands stress cracking and abrasion.

In addition to ALATHON polyethylene resins, Du Pont has RULAN flame-retardant plastics and ZYTEL nylon resins designed to solve your other wire and cable problems. Find out how by writing: E. I. du Pont de Nemours & Co. (Inc.), Advertising Department, Room 175, Nemours Building, Wilmington 98, Delaware.

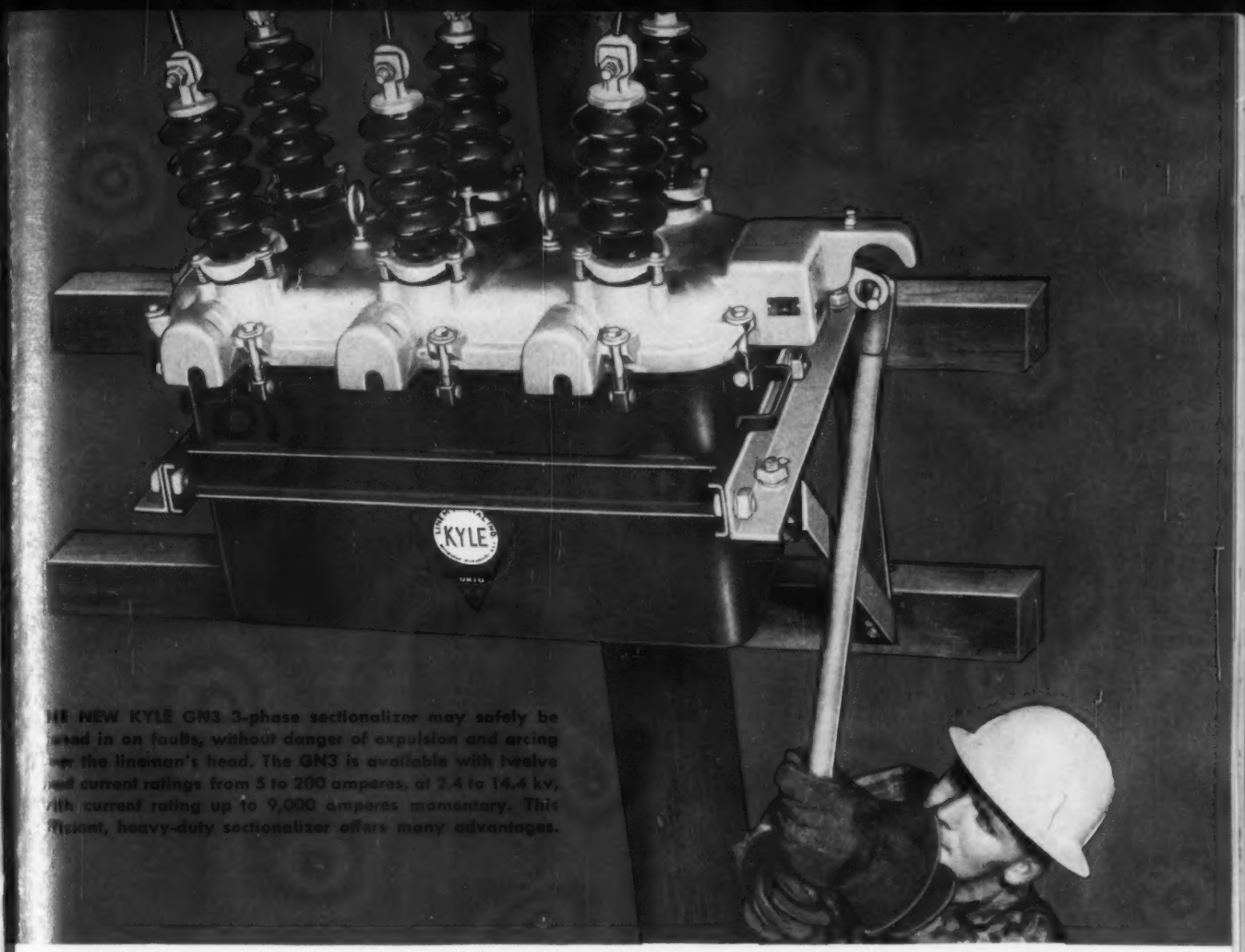
POLYCHEMICALS DEPARTMENT

DU PONT

REG. U.S. PAT. OFF.

Better Things for Better Living . . . *through Chemistry*

ALATHON® POLYETHYLENE RESINS | **RULAN®** FLAME-RETARDANT PLASTICS | **ZYTEL®** NYLON RESINS



HE NEW KYLE GN3 3-phase sectionalizer may safely be ...sed in on faults, without danger of expulsion and arcing ...r the lineman's head. The GN3 is available with twelve ...d current ratings from 5 to 200 amperes, at 2.4 to 14.4 kv, ...ith current rating up to 9,000 amperes momentary. This ...fficient, heavy-duty sectionalizer offers many advantages.

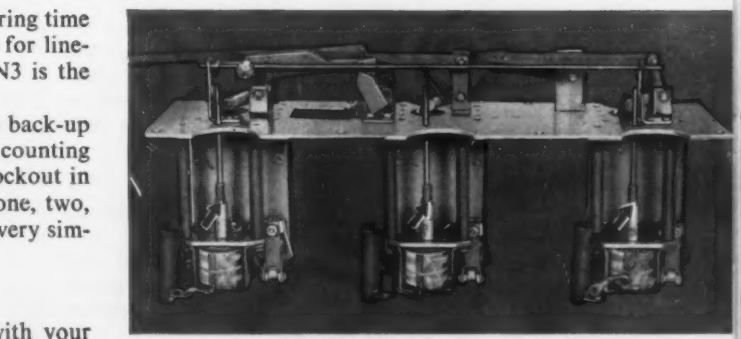
L-M Announces New Kyle Type GN3 World's First 3-Phase Sectionalizer

The new Kyle GN3 cuts service trips and saves engineering time because it simplifies coordination problems. It is safe for linemen to operate, when closing in on a fault. The GN3 is the first 3-phase sectionalizer on the market.

Kyle sectionalizers operate, and lock out, while the back-up recloser is open. The GN3 incorporates single-phase counting with positive internal interphase linkage for 3-phase lockout in a single tank. The GN3 may be set to lock out after one, two, or three operations of the recloser. This adjustment is very simple; it may be made in the field if desired.

Get Complete Information

Discuss the use of sectionalizers instead of fuses with your associates. The GN3 can offer some marked savings and operating advantages. Ask the L-M Field Engineer for complete information, or write for bulletin. Line Material Industries, Milwaukee 1, Wis. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.



COMPLETE GN3 MECHANISM lifted out of the tank. To set to lock out after one, two, or three operations of the backup recloser, simply re-index each trip piston extension of the sectionalizer (arrows). With interphase linkage inside the tank, there is no possibility of misalignment or operating difficulty because of corrosion or icing.

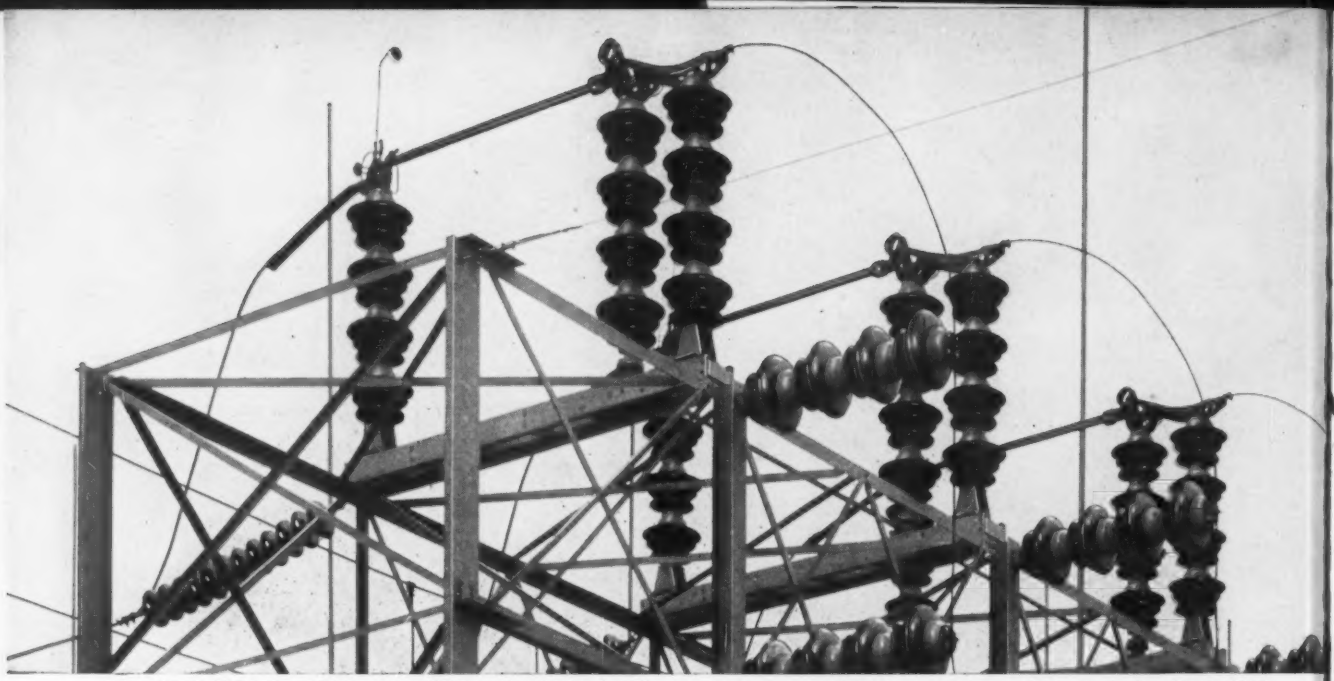
LINE MATERIAL® Industries *Kyle® Switchgear*

McGRAW-EDISON COMPANY

397

DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS
POWER SWITCHING EQUIPMENT • PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING
LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE AND CONDUIT

McGRAW EDISON



One of 12 L-M 161-kv, 1200 ampere PV switches in the Amelia, Texas, loop switching and bulk substation of Gulf States Utilities. This is a 30,000/50,000 kva station with 138-kv incoming and 69-kv outgoing sub-transmission lines. With minor structural changes, a second transformer of the same or larger size can be added to meet future load requirements.

L-M High-Voltage Switches—Built Today To Serve Tomorrow's Growing Needs

L-M Power Switching Equipment, the most recently designed line on the market, takes advantage of the latest developments in the science of switching, offers features far ahead of older switch lines.

by **W. V. SWAN**, Product Manager,
Power Switching and Substation Equipment
Line Material Industries

Six years ago Line Material began a complete redesign of its entire switch line. All traditional, time-worn practices were discarded. New ideas, based on the latest switch research and developments, were examined and thoroughly tested. The result is the most up-to-date line of power switching equipment on the market. We at Line Material feel that our switches offer many advantages over other switches still being made from original tooling.

Check These Design Features

L-M Power Switches offer outstanding modern and exclusive features such as these:

- Smooth-operating ball bearings in blade guides and main bearings are lubricated with temperature-proof silicone grease, and sealed with silicone cord rings that resist temperature, oxidation, and corrosion indefinitely.
- Sealed current interchange utilizing a silver-plated beryllium copper spring enclosed in the blade-guide, instead of braid—a well-known potential source of trouble.
- Tremendous mechanical leverage to break ice and corrosion. The blade rotates 26 degrees to release itself before starting to rise more than a few degrees.
- High-pressure silver-to-silver contacts, with extra back-up copper to provide higher thermal capacity.
- Minimum number of current interchange points.
- Extremely flexible, easy-operating interphase mechanism with compensation for misalignment. Here, as with all other bearings and moving joint locations, silicone grease lubrication and silicone cord rings are used.

Wide Choice of Switches

L-M Power Switching Equipment includes the following:

Type PV group-operated vertical-break switches for horizontal, vertical, or inverted mounting through 1200 amperes, 161-kv

Type PH horizontal-break switches through 1200 amperes, 115-kv

Type PES and PED single and double throw hook-operated disconnects through 1200 amperes, 69-kv

Type PHF multiple switch arrangements for vertical mounting on a single wood pole, with or without quick-break attachments, through 1200 amperes, 69-kv

A variety of accessories, including oil and air interrupters, quick-break attachments, tilting insulator switches, and a complete line of unique bus supports that provide wide interchangeability and thus greatly reduce inventory requirements.

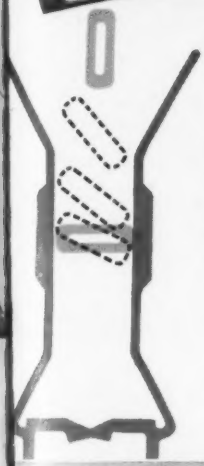
Let Us Give You Details

There are many more advantages of L-M's switch line—"built today to meet tomorrow's needs." Ask the L-M Field Engineer for bulletins and information; or write me at Line Material Industries, Milwaukee 1, Wisconsin.

LINE MATERIAL® Industries
McGRAW-EDISON COMPANY

BLADE DESIGN AND ICE BREAKING ROTATION

Upper illustration shows cross sections of the heavy extruded copper blade. Lower illustrations show how the blade rotates 26 degrees to break ice and corrosion, and release contact pressure before beginning to rise.



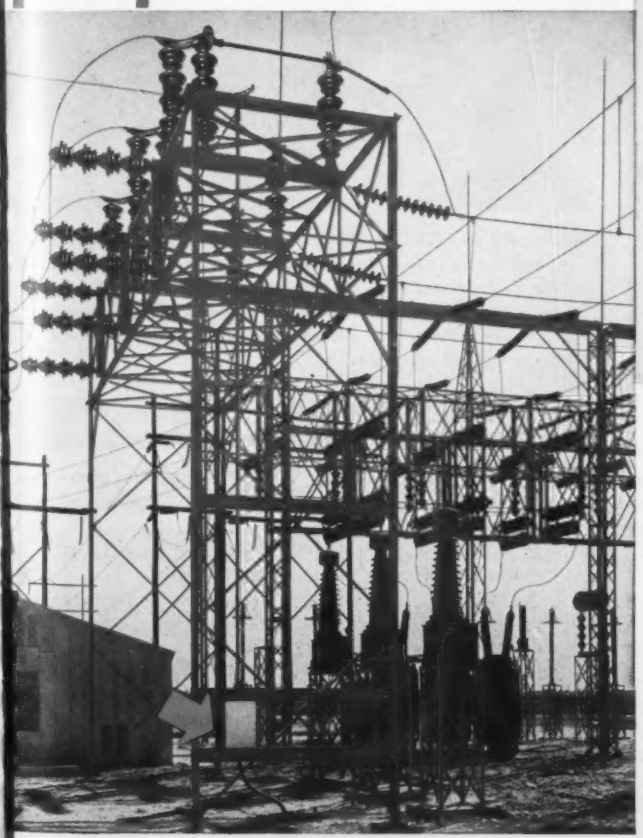
SEALED CURRENT TRANSFER METHOD

Instead of carrying current through the bearings or braid at the hinge end, L-M switches employ a permanently sealed, lubricated low-resistance device designed by L-M. This consists of a silver-plated beryllium copper coil which provides an almost infinite number of high pressure contact points between the switch blade and blade guide, and also between blade guide and main frame casting.

Ask for special bulletin No. 57077 on Sealed Current Transfer Method.

BALL BEARINGS WITH SILICONE CORD RING SEALS

Smoothly operating ball bearings are lubricated for life with temperature-proof silicone grease, and completely and permanently sealed with silicone cord rings which are unaffected by temperature changes, oxidation, or corrosion.



MOTOR-OPERATED SWITCH

L-M motor-operated 161-kv, 1200 ampere PV switch. The silicone-ring-sealed ball bearings and easy-operating interphase mechanism make it very easy to operate this big 3-phase switch.

HIGH-PRESSURE CONTACTS PRE-LOADED TO 175 POUNDS

Jaw contact assembly. Large hard-drawn copper shoes have silver inserts. Six heavy leaf springs held by tie-bar maintain uniform 175-pound pressure on the contacts. The tie-bar permits accurate and permanent factory adjustment of contact pressure.

Power Switching Equipment

McGRAW EDISON

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DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING • LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE AND CONDUIT

JUNE IS L-M SUBSTATION MONTH!

New L-M Feeder-Pak® Provides Compact, Low-Cost, Low-Voltage-Side Unit

Shipped in pre-wired, assembled sections, ready for fast, economical installation in substation as complete 15 kv feeder unit.

by **W. V. SWAN**, Product Manager
Power Switching Equipment
Line Material Industries

The new L-M Feeder-Pak is a complete unit for the low-voltage side of a substation. It provides support for feeder conductors, disconnect and by-pass switches, lightning arresters, current transformers, and substation-type R or W three-phase Kyle heavy-duty recloser.

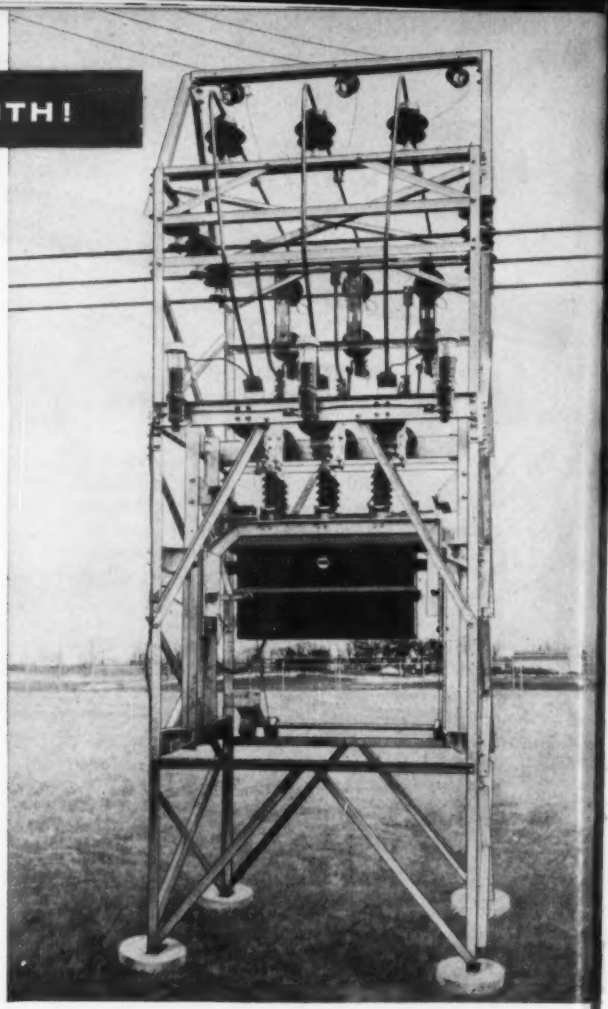
Neat, Compact

The unit has a very neat appearance. It is compact, easy to install. The whole unit comes in easy-to-handle crates. Additional units can easily be added when additional feeders are needed. Or units can be removed to other locations.

The Feeder-Pak costs about the same as the *materials* for a conventional open-type feeder position, but installation costs are far lower. Bus, insulators, switches, and arresters are all in place. No concrete pad is needed—only footings for the four legs. And it takes less land area—it's only 5 feet, 4 inches square!

Easy to Install

To erect the L-M Feeder-Pak, simply bolt the lower section to the concrete footings; set the upper section into the lower section and bolt; raise the recloser into position with the hoisting mechanism included in the lower section. Self-aligning bayonet-type contacts work automatically as recloser is raised into position. Automatic interlock prevents lowering the recloser until recloser contacts are opened.



THE NEW L-M FEEDER-PAK. The lower pre-assembled steel section contains the recloser, and recloser lifting frame and lifting mechanism. The unit is neat, compact. Base is only 5 feet, 4 inches square. It saves land, cuts installation and maintenance time. No mounting pad is required—just footings for the four legs.

L-M Feeder-Pak Features

1. With Kyle Type R or W recloser provides complete structure and equipment for low-voltage side of the substation.

2. Complete; compact; neat. Saves land costs; requires no pad; cuts installation man-hours.

3. Shipped as partly assembled units, crated for easy handling. Switches, arresters, and recloser disconnects are all pre-wired, and installed. Current transformers if desired.

4. Additional feeder positions are easy to add; or the Feeder-Pak may be removed to another location if desired.

5. Recloser lifting frame and tank lifting device make recloser maintenance safe and simple.

LINE MATERIAL® Industries
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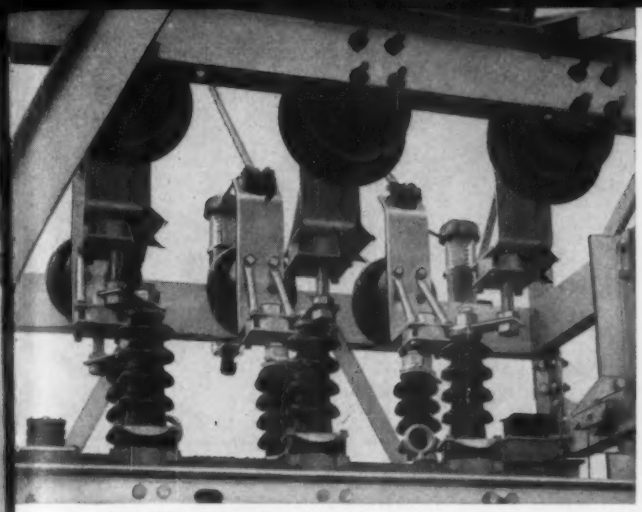
McGRAW EDISON

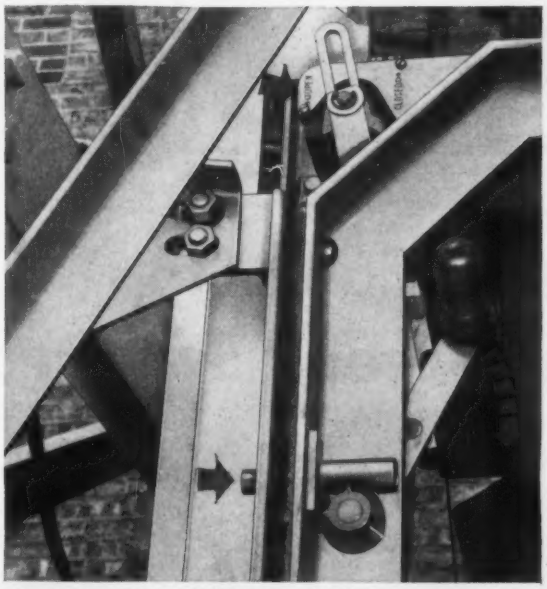
Substations and Power Switching Equipment®

399

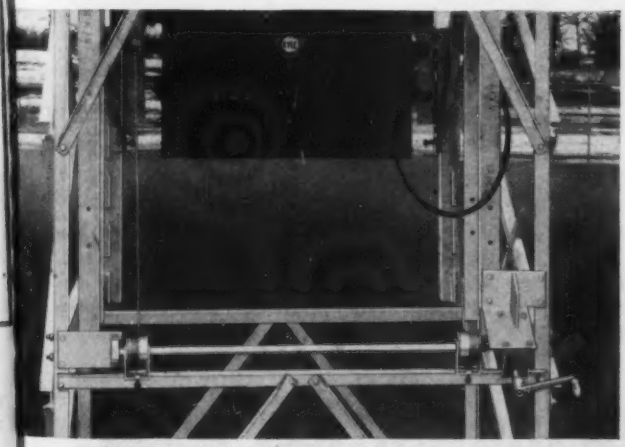
DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
PACKAGED SUBSTATIONS • CAPACITORS • REGULATORS • OUTDOOR LIGHTING • LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE AND CONDUIT



BAYONET CONTACTS on the recloser bushings are raised into the self-aligning automatic disconnects when the recloser is lifted into position. Thus connections are made safely, simply, and automatically.



CONTROL LEVER INTERLOCK. Recloser cannot be lowered until recloser contacts have been opened by moving the handle down (arrow).



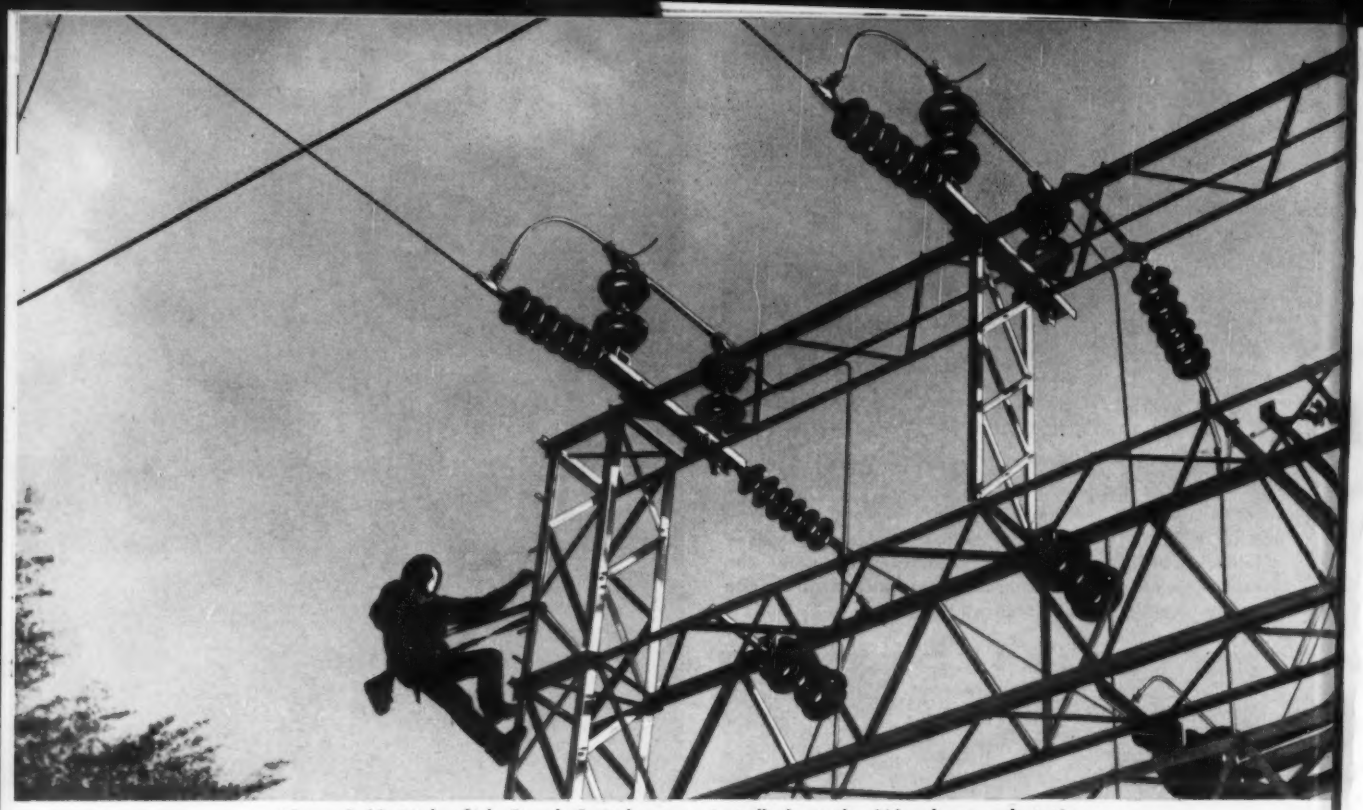
RECLOSER LIFTING MECHANISM makes it easy to lower the recloser, and, if desired, to lower the tank to inspect the mechanism, change coils or time-current characteristics —which is easily and accurately done on Kyle reclosers— or for periodic oil change.

LINEMAN CLOSES BYPASS SWITCHES before lowering the recloser. These are L-M Type HXO heavy-duty fused switches. They are mounted on the frame and connected to the bus at the factory.

WHEN LOWER FRAME IS MOUNTED ON FOOTINGS, upper sections are simply mounted into position and bolted to the lower section at the corners. This is all it takes to assemble the entire unit!

Get This Data on New L-M Feeder-Pak

Let us provide complete information on standard equipment and optional accessories. Then check your own present and proposed substation locations to see how this new L-M Feeder-Pak will save you money and man-hours, installation and maintenance. Talk to the L-M Field Engineer. Or write Line Material Industries, Milwaukee 1, Wisconsin. In Canada: Canadian Line Materials, Ltd., Toronto 13, Ontario.



These L-M 69 kv Side-Break Switches are installed at the Woodacre substation of Pacific Gas & Electric Company, in Marin County, California.

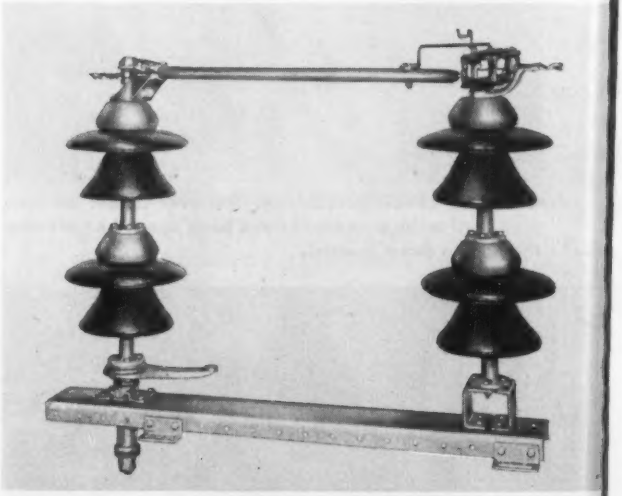
Storms, Sleet, Corrosion Can't Stop These Tough L-M Side-Break Switches

L-M Type PH Side-Break switches are ruggedly designed, with high current-carrying capacity built in. This is achieved by having only six current transfer points, high-pressure silver-to-silver contacts and heavy back-up metal.

Switches like those shown have come through lightning storms which blew protective fuses on the load side, without damage. L-M 69 kv side-break switches have been opened with line charging current on the line, under near-emergency conditions with no observable damage to the switches.

This strength and overload ability is typical of L-M equipment, which is built to do more than just meet standards. That's why so many utility engineers depend on L-M equipment — it's reliable.

For information on L-M power switches, packaged substations, transformers, Kyle reclosers, and other distribution apparatus, ask the L-M Field Engineer or call any of L-M's sales offices. Line Material Industries, Milwaukee 1, Wisconsin.



L-M 69 KV SWITCH. Available in sidebreak (above), and vertical break, for any standard mounting. Outstanding features are the powerful lever action for breaking ice and corrosion; heavy silver-to-silver inserts in high-pressure contacts; high current capacity; silicone-cord-ring-sealed bearings for easy operation; extremely flexible for misalignment.

395R

LINE MATERIAL® Industries

McGRAW-EDISON COMPANY

DISTRIBUTION TRANSFORMERS • KYLE RECLOSERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS
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LINE CONSTRUCTION MATERIALS • PORCELAIN INSULATORS • FIBRE PIPE AND CONDUIT

Editorial Comment

MAY 25, 1959

Buy Utility Stocks for Safety

In case you missed the article entitled "Utility Stocks in the '59 Market" which appeared in the May 11 issue of Electrical World, we suggest that you look it up. We believe that this article is of unusual importance today when everyone is wondering about the true value of common stocks. It is an article that everyone in the industry should read and perhaps send to stockholders. It might also be worthy of distribution to all employees.

The important point of this article is that it shows why utility stocks are probably the best buys in today's market. While every Tom, Dick, and Harry is looking around for a quick buck in an electronics stock, they are probably missing an opportunity to make a good profit safely in utility stocks. As the article points out, the price-earnings ratios of utility stocks, as compared to industrials, are more favorable now than they have been for sometime. Compared with 1929, utility stocks are selling at a very conservative level.

Lately it has been interesting to note that when the "glamour" stocks go down, the utility stocks go up. This shows that investors with a profit are looking for safety in utility securities. But they are still leaving their money in common equities, which continue to appreciate as the economy expands.

Of course the industry cannot oversell the safety and growth features of its common stock. Some are selling at quite a premium. But it might be smart to point out the record to everyone. It would provide a public service in preventing dangerous speculation in "cats and dogs," and would lay the groundwork for the industry's financing requirements of the future.

Procurement and Products

Every member of management is involved in the procurement of goods and services. With the annual expansion of industry, this task grows in dollar value of goods and services.

Electrical World has recognized this fact and provided editorial material pertinent to the subject. But we are never satisfied with just presenting added information. We also endeavor to present the material in the form most convenient to you, our reader.

That is the reason we recently initiated a new section entitled "Procurement & Products." Now everyone can find this easily identified section and review the latest developments in prices, products, supplies, buying techniques, and related topics. For "Procurement & Products" in this issue, turn to page 84.

Appraisal of Advertising Points Up the

'More time, more media and more effective ways to tell our story' is answer, says Texas P&L Vp at PUAA. Newspaper executive urges frankness

Federal encroachment and the need for better programs to inform the public on the public ownership issue were the favorite topics of speakers at the 38th annual Public Utilities Advertising Association convention in Dallas May 6-8.

One of the most outspoken speakers was Charles W. Wooldridge, vice president, Texas Power & Light Co, who said the industry's biggest problem is to inform the public.

"The greatest challenge facing the utility industry today is not to achieve more scientific breakthroughs—nor to secure greater financial strength," he said.

"The greatest need is to put to work some of our resources of imagination and creativeness to inform our employees, shareowners, customers and friends of the fallacy and danger inherent in government encroachment and competition, and the advantages accruing to all the people through the normal operation of the traditional American system.

WOOLDRIDGE: Put resources to work

"With brilliance and creative effort the advertising industry has awakened the American public to the need of early detection and treatment of cancer, polio and heart disease. We need now to make the public more conscious of other forms of malignancy and more appreciative of the enormous accomplishments of the investor-owned, business-managed, tax-paying utility industry.

"A simple and modest recitation of our story never ceases to thrill all who treasure our American heritage. We need only to find more time, more media, and more effective ways to tell our story."

Felix R. McKnight, vice president and executive editor of Dallas Times Herald, told the convention that the "public takes you for granted, but what you have to tell is a dramatic story."

McKnight advised utilities to tell a frank, complete story. For instance, it wouldn't hurt to publicize

Pacific G&E Wins Nine Awards, Topping the 97 Utilities

PUAA honors in the field of advertising were won by 97 utility companies in the U. S., Canada, Cuba and Hawaii. Award certificates were given for achievment in 19 classifications of advertising and public relations material. In all, 156 awards were presented.

Except for radio, TV, and motion pictures—in which all utilities competed as a group—entries were divided into three categories of up to 150,000 customers, more than 150,000 and less than 400,000, and more than 400,000.

Winning the most awards was the Pacific Gas & Electric Co with four first, two second, and three third place awards, for a total of nine awards.

Wisconsin Public Service Corp won five awards, and six companies won four awards each: Texas Power & Light, Gulf States Utilities, Southern California Edison, Consolidated Edison Co of New York, Philadelphia Electric, and Laclede Gas.

Three awards each were won by five companies, 18 companies won two awards each, while 65 utilities each were awarded one certificate. All award-winning material has been published in the association's annual Better Copy Contest Awards Book.

More than 2,000 entries were received in the contest, the 36th conducted by PUAA. The contest was described as the oldest continuous advertising competition by James W. Lumpp, Union Electric, competition chairman.

Complete Program—Group A: So Cal Ed, Pacific G&E, Brooklyn Union Gas. Group B: United Fuel Gas, Wisconsin PS, Indianapolis P&L Group C: Hope Natural Gas, Hartford Gas, Mississippi Valley Gas.

Ad Series on PR Subject—Group A: Cleveland Electric, Wisconsin Power, Con Ed. Group B: Columbus & Southern Ohio Electric, Wisconsin PS, Texas P&L. Group C: Piedmont Natural Gas, Otter Tail Power, Interstate Power.

Single Newspaper Ad on Any Subject—Group A: Pacific G&E, Cleveland Electric, Con Ed. Group B: Pacific P&L, C&S Ohio Electric, Peoples Natural Gas. Group C: Honolulu Gas, Western Mass. Electric, Canadian Western Natural Gas.

Employee Magazines—Group A: Pacific G&E, Northern Illinois Gas, Con Ed. Group B: Oklahoma G&E, United Illuminating, Central Illinois PS. Group C: West Texas Utilities, Northwestern Utilities and Canadian Western Natural Gas, Minnesota P&L.

Need for Better Information Programs

facts concerning heavy utility tax payments in good institutional advertisements.

Utility advertising must be a model of simplicity because of the wide range in the audience, McKnight added.

The PUAA was given a look at happenings in Washington by Joseph T. McDonnell, general counsel, National Association of Electric Companies. He emphasized the battle being waged against federal encroachment in giving a rundown on legislation and proposed legislation affecting utilities.

In other talks, C. S. Stackpole, managing director, American Gas Association took a stand against negative advertising.

"You are never very successful by talking negative, and at local levels too many times too much effort is given to rapping the competition. We should spend the time to tell what is good about electricity or gas and not in rapping each other."

Mort Farr, chairman of the board, NARDA, discussed "What the Utility Should Do to Help the Dealer." He stressed that through advertising the utility has the opportunity of helping the dealer not only to increase traffic, but to make sales.

McKNIGHT: 'A dramatic story'

Elected president of the PUAA was Warren Widenhofer, public relations director of Indiana & Michigan Electric Co. Other officers elected were Frank C. Lietz, advertising manager, Northern Illinois Gas Co, 1st vice president; Jack A. Fleming, director of public relations for Canadian Western Natural Gas Co, Ltd and Northwestern Utilities, Ltd, 2nd vice president; James Lumpp, advertising manager, Union Electric Co, 3rd vice president; Robert H. Robertson, director of advertising, Florida Power Corp, reelected secretary; and Mead Schenck, director of advertising, Interstate Power Co, reelected treasurer.

Three new directors named were Elton E. Stuenckel, advertising manager, South Jersey Gas Co; George Lamason, advertising and public relations, Kentucky Utilities Co; and Norman Jacobshagen, advertising manager, Kansas Gas & Electric Co.

Retiring president was George W. Kindon, Philadelphia Electric Co. Kindon becomes ex officio member of board for one year.

Who Submitted More Than 2,000 Entries for 36th Contest

Employee Newspapers—Group A: Kentucky Power, Texas Eastern Transmission, Ohio Power. Group B: Texas Electric Service, Atlantic City Electric, Montana Power. Group C: Idaho Power, Inter-Mtn Gas, Black Hills P&L.

Direct Mail Series—Group A: Virginia E&P, Northern States Power, Philadelphia Electric. Group B: West Penn Power, Milwaukee Gas, Metropolitan Ed. Group C: Washington Water Power, Indiana G&W, Norwood Gas.

Single Piece Sent to Customers—Group A: East Ohio Gas, So Cal Ed, Baltimore G&E. Group B: Indianapolis P&L, Portland GE, Wisconsin PS. Group C: United Gas, Hope Natural Gas, California-Pacific Utilities.

Dealer Promotion Material—Group A: Detroit Ed, So Cal Ed, Connecticut L&P. Group B: Jersey Central P&L, Texas P&L, Wisconsin PS.

Special Employee Literature—Group A: Philadelphia Electric, Alabama Power, Connecticut L&P. Group B: Iowa P&L, Central Hudson G&E, Texas P&L. Group C: California-Pacific Utilities, Interstate Power, Northwestern Utilities, Ltd.

Window Displays—Group A: PS of Colorado, Virginia E&P, Cia. Cubana de Electricidad. Group B: Iowa L&P, Gulf States Utilities, Kansas City P&L. Group C: Minnesota P&L, South Jersey Gas, SE Michigan Gas.

Interior Displays—Group A: Cincinnati G&E, Washington Water Power, Philadelphia Electric. Group B: Dallas P&L, C&S Ohio Electric, Houston Natural Gas. Group C: South Jersey Gas, Chattanooga Gas, Tampa Electric.

Car, Bus Cards, Truck Posters—Group A: Pacific G&E, Con Ed, Michigan Con Gas. Group B: Portland GE, Gulf States Utilities, British Columbia Electric. Group C: South Jersey Gas, Northwestern Utilities Ltd and Canadian West. Natural Gas, Savannah Gas.

Outdoor Ads—Group A: Pacific G&E, Dayton P&L, Commonwealth Ed. Group B: Gulf States Utilities, Texas P&L, Wisconsin PS. Group C: Hope Natural Gas, St. Joseph L&P, Washington Water Power.

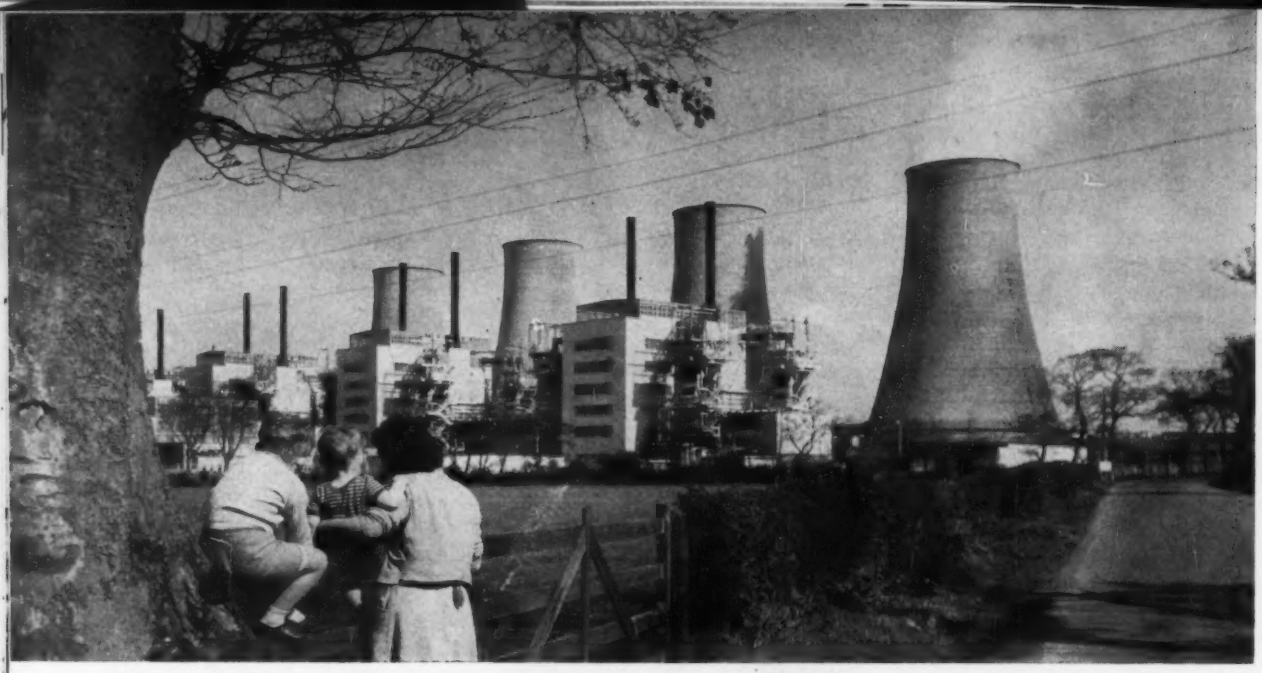
Annual Report—Group A: Consumers Power, Dayton P&L, Texas Gas Transmission. Group B: Laclede Gas, Pioneer Natural Gas, Kansas G&E. Group C: Hawaiian Electric, Minn. P&L, Wash. Natural Gas.

Radio—Group A: Philadelphia Electric, Southern Union Gas, Detroit Ed. Group B: Arkansas P&L, Atlantic City Elec, Laclede Gas.

Motion Pictures—So Cal Ed, Southwestern PS, Pacific G&E.

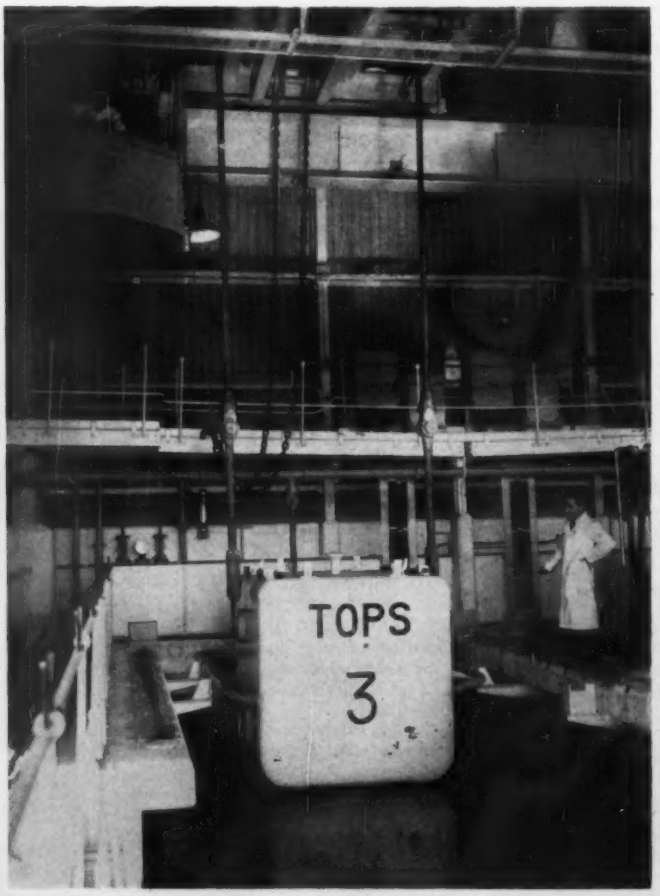
Television—Group A: Illinois Power, Pacific G&E, Duquesne Light. Group B: PS of Colorado, Laclede Gas, Cincinnati G&E.

Newspaper Ad Promoting Electricity Use—Group A: Detroit Ed, Ohio Power, Pacific G&E. Group B: Potomac Ed, Southwestern PS, Gulf State Utilities. Group C: Wheeling Electric, Hawaiian Electric, Western Mass. Elec.



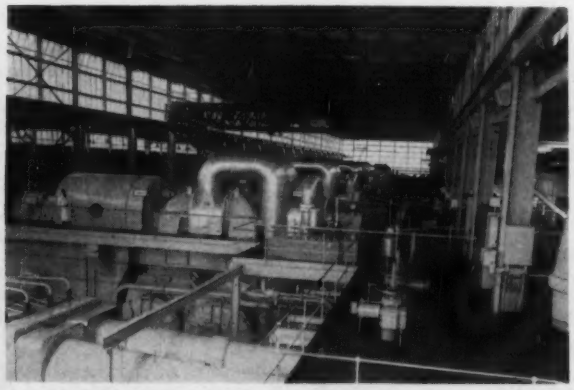
SCOTLAND'S FIRST nuclear plant, and second in United Kingdom, will produce 184 Mw in 1960: 140-Mw of this will be fed into Britain's grid. A replica of Calder Hall, the plant uses natural uranium fuel, graphite moderation

Chapelcross A-Plant Joins British Grid



Formal inauguration ceremonies early this month marked the introduction of power from the Chapelcross nuclear station to Britain's national grid. The first of four reactors went into operation last February. When completed early next year, total plant capacity will be 184,000 kw. Chapelcross, located in Dumfriesshire just across the border from England, is a replica of the plutonium and power producing Calder Hall, which is the prototype of eight A-plants under way or proposed in a program to provide about 25% of Britain's electricity needs in 1966. Cost of Chapelcross will be $95.2 million.

URANIUM FUEL ELEMENTS' COFFIN, weighing 50 tons, is raised from 20-ft deep pond where it has been stored



TURBINE HALL view of the $95.2-million station shows 23-Mw turbo-alternator, foreground, began operating February

Approval Expected on Atomic Power Bill

Nine new reactors costing $100 million recommended. High-temperature proposal periled by reimbursement proviso

Barring unforeseen complications, Congress appears set to approve an atomic power construction bill which is a far cry from the ambitious all-federal reactor program feared by some following last November's Democratic victory.

The Joint Committee on Atomic Energy within a few days is expected to put the final touches on a measure—already cleared by its legislative subcommittee — which would authorize construction or support of nine new reactors at a cost of some $100 million.

Final passage by the House and Senate then is expected with little or no controversy on the floor.

Although the full committee is expected to make some changes—a capital grant provision may be written in, for example—the bill is expected to authorize appropriations for the following projects:

- Research and development aid toward construction of an advanced high-temperature gas-cooled experimental reactor by General Dynamics-Philadelphia Electric group.

However, restrictive language is imposed—requiring reimbursement to the government if industry fails to go through with construction—which could endanger the project unless modified before enactment.

The bill authorizes $50.5-million for this and other cooperative demonstration projects, not including authority for AEC to waive fuel and heavy water use charges up to $10 million.

- Government construction at Oak Ridge, Tenn., of a $30-million, experimental prototype gas-cooled reactor based on the Kaiser-ACF design.
- Some $11-million is authorized for construction, either by government or as a cooperative project, of a power reactor capable of utilizing nuclear superheat. Although the bill does not specify, key Democrats are still in favor of putting the reactor in Puerto Rico.
- The third round power reactor demonstration program would be extended to June 30, 1960.
- The so-called second round program for rural co-ops and municipal utilities would be re-opened through June, 1960, too. AEC would support development, construction and operation of two reactor types "based on established reactor technology."
- Federal construction of a $6-million experimental organic-cooled reactor at an AEC site.
- Government construction of an experimental low-temperature process heat reactor.
- An extra $2-million would be authorized for further design and development work on a heavy water moderated, natural uranium reactor. But no prototype construction is authorized.
- Additional funds for cooperation with euratom would be limited to $7-million, instead of $14-million as requested by AEC.
- Some $3.5-million would be authorized for design studies of a prototype reactor for nuclear tanker propulsion, for a power reactor at a remote military installation and for further power reactors.

This program comes very close to what AEC Chairman John A. McCone, himself, requested. The only addition of major consequence is the nuclear superheat project.

FPC Faces Ticklish Question on Gas Use for Boilers

When does an air pollution problem permit the Federal Power Commission to authorize use of natural gas for electric generation? It's a ticklish question — usually surrounded with complicated conditions—and the commission's policy isn't always clear on the surface.

Back in 1953, although not the first mention of the problem, the FPC stated: "We have repeatedly held that the use of natural gas as boiler fuel is an inferior usage and that, while it is not to be denied in all situations, it should be permitted only on a positive showing that it is required by public convenience and necessity."

Still to be answered is: What's required for a positive showing?"

For example, last year, FPC Examiner William Costello ruled in favor of a proposal by Transcontinental Gas Pipe Line Corp to transport up to 50-mcf daily to New York City, where Consolidated Edison Co would use it to convert several boilers to gas at its Waterside Plant. Con Ed was to buy the gas directly from Texas producers to help reduce air pollution and meet winter gas demands.

Costello pointed out that the FPC had no legal basis for judging the merits of how Con Ed would use the gas, as long as it had no bad effect on other gas sales to consumers for space heating.

The full commission, however, reversed Costello and denied the sale on two grounds: **1.** Con Ed's plan to buy directly from gas producers in the field might lead to higher prices. **2.** Con Ed did not plan to convert all Waterside boilers. So pollution still would exist.

More recently, another FPC examiner, Samuel Binder, ruled that El Paso Natural Gas should be allowed to sell up to 100-mcf daily to Southern California Edison Co to permit conversion of oil-burning boilers. "The problem of the sale of gas (here) poses factors not present in many areas of the U. S.," he pointed out. "Among other things this area has no coal which may be used on a commercial basis. In addition, there is a serious health problem due to air pollution. . ."

How the full commission will rule on Binder's decision is anybody's guess.

POLE PICKET LINE, formed after union pledge to safeguard public, was crossed by police-escorted supervisors who made repairs. Some switch pulling was reported

Negotiations Stalled In New Jersey Strike

Thirteen locals of the International Brotherhood of Electrical Workers began a walkout May 15 from their Public Service Electric & Gas Co jobs after turning down a 4.97% package offer by the utility. The locals' spokesmen maintain this isn't adequate, but as of last Wednesday had not defined what they regard as adequate, said a PS executive. At the start of negotiations, PS offered a 3.5% boost while the union sought fringe proposals amounting to about a 7% increase, not including wages. Grade I workers would get $3.23¼ an hour under the utility's proposed increase. This would top the scale now being paid by any other electric utility in the east PS said.

Since the 5,400 employees struck, fuses have been removed from a number of street light time controls and service for a few commercial customers has been interrupted. A reward of $5,000 has been set for information leading to conviction of vandals.

Supervisors have made repairs where necessary and maintained service. A manually controlled system, PS generation was "completely normal," with power plant supervisors staying in stations around the clock. But about 1,700 office workers have refused to cross picket lines.

Change Planned for FPC Accounts System; Line Sale Ok'd

Revision to follow NARUC proposal; Vermont action ties in with state-wide grid; Montana pay to Indians hiked

Three steps applying to electric utility operations were taken recently by the Federal Power Commission.

First, the agency announced plans to revise its Uniform System of Accounts, set up in 1936, along lines proposed last November in a resolution of the National Assn of Railroad & Utility Commissioners.

The revisions would not change any basic principles or interpretations, the commission emphasized, but they would "provide more informative account arrangements."

Principal changes would be: **1.** Revised size classifications to permit simpler accounting procedures for small utilities. **2.** Inclusion of accounts for nuclear power operations. **3.** Reduced categories for expense accounts. **4.** Clarified accounting texts and instructions plus simplified account numbering. **5.** Reduced special filing instructions. **6.** Rearranged balance sheets. **7.** Increased and more clearly-defined item lists in account texts. **8.** Provision for the effect of past interpretations on accounting.

Written comments on the proposed changes will be accepted by the FPC until June 15.

Central Vermont Public Service Corp was authorized to sell 46 mi of 115-kv line to the recently-formed Vermont Electric Power Co, Inc, as part of the Vermont state-wide grid to distribute 100,000 kw of St. Lawrence power.

Central Vermont's facilities will be sold to VEP at a depreciated book cost of $712,994, and a portion of the line will be leased back to Central Vermont for joint use by it and VEP.

FPC Examiner Francis Hall ruled that five intervenors who opposed the transfer—three co-ops and two municipal systems—had overlooked the fact that "the interest of the whole state" was more important than possibly lower power rates to the five intervenors, if the transfer was denied. Hall's decision is subject to review by the full commission.

Montana Power Co must increase its annual payments to Indians on the Flathead Reservation, Mont., by $50,000 because of the addition of a third power unit to the company's Kerr Dam in 1954, an FPC examiner has ruled.

The company previously was paying the Indians $175,000 a year for use of the land flooded by the Kerr Project. It claimed that no additional payments should be made to the Indians because the added power unit (56,000 kw) would not require any more reservation lands to be flooded by its use.

FPC Examiner Edward Marsh ruled, however, that although the Indians contributed nothing else to what they had already provided for the original reservoir site, the change in the project's operation "substantially affects" the Indians' interest. The decision is subject to review by the full commission.

Metermen Discuss Practices

EEI-AEIC group confers at St. Louis on random sample testing, automatic reading developments and code revisions

O. K. COLEMAN, Duncan Electric Co, in his capacity as consultant to EEI on code matters, discusses 1959 changes in the National Electrical Code. Listening attentively at Coleman's left is Adolph Rauth of Consumers Power Co

Random sample testing and automatic meter reading were discussed at the EEI-AEIC Meter & Service Committee meeting April 27-29 in St. Louis, Mo. Prevailing practices in meter departments, new methods and developments, and 1959 changes in the National Electrical Code were other topics.

Among reports on random sample testing of meters was one by J. A. Morris, American Electric Power Service Co. It noted that action taken by the power companies would have to have the approval of commissions, particularly state commissions.

Use is Spreading

Of 53 companies represented, 15 indicated that they were using some form of random sample testing, and 34 that they plan to do it when they have approval from local commissions.

Experience reports indicated that meters in error can be found just as effectively and less expensively by random sample testing as by periodic testing.

Five manufacturers have shown interest in building equipment for automatic meter reading, said J. S. Lineback, Cincinnati Gas & Electric Co. One scheme would make use of telephone lines; it has been patented. Another would equip a truck with a transmitter, the truck to be driven up and down streets to pick up readings at a rate of up to 25,000 per day.

The new National Electrical Code changes, said O. K. Coleman, Duncan Electric Co, must have a preponderance of acceptance to be effective. Some new provisions, he said, deal with grounding, increased requirements for office building loads, higher demand factors for use in calculating office building loads, and minimum service entrance and circuit needs.

Coleman indicated that there was some tendency to legislate practices that should be handled by selling them to the public. This, he said, resulted in excessive safety factors and the spending of money for equipment the customer will not use.

Electric utilities should pursue higher secondary and utilization voltages and get the benefits of their "increased load hauling ability," said F. G. Joseberger, Long Island Lighting Co. He drew a parallel with the trend toward higher primary voltages to obtain greater load hauling ability.

R. W. Banks, Consolidated Edison Co, reported a survey on new methods in meter departments, including:

Special provisions by Public Service Co of New Hampshire to exhaust fumes from an ultrasonic register cleaner.

A "go-no go" signal on a conveyor belt in Consumers Power Co's assemblyline meter test setup. When a meter tested does not meet requirements, the signal stops the belt.

A portable standard leveling device for meter disks, circular levels on watthour meters, and mark-sense charts at Long Island Lighting Co.

Code Revision Starts

S. B. Vaughn, Florida Power Corp, reported that meter covers are cleaned ultrasonically 100 per hr in the company's shop.

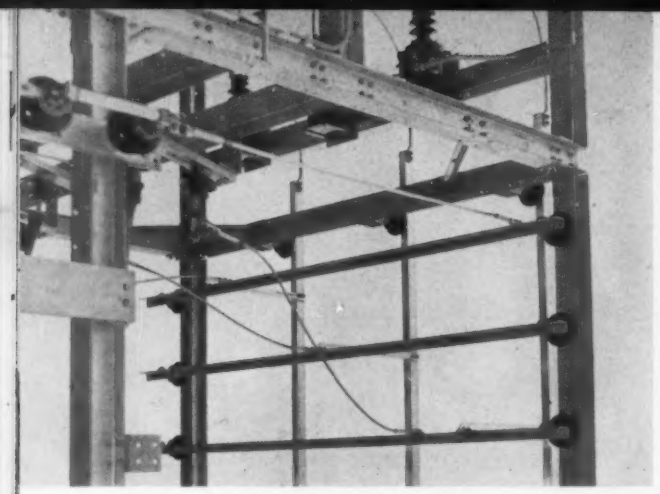
V. W. Nass, Commonwealth Edison Co, and W. H. Farrington, Texas Electric Service Co, described shop-assembled cluster mountings for metering transformers on poles for primary metering purposes. They cost less to install and reduce connection errors.

Work is started on a revision of the "Code for Electric Meters," reported R. B. Swallow, Public Service Electric & Gas Co. The meter code has not been revised since 1941.

Al Bus Saves in

L. C. WEBER, Northern States Power Co, Minneapolis, Minn.

H. FOSSUM, Pioneer Service & Engineering Co, Chicago, Ill.



LOW-COST FITTINGS can be used with aluminum angle buses, whose flat surfaces are suitable to terminal lugs, etc.

The application of aluminum angles cut the cost of distribution substation bus on the Northern States Power Co system. Savings were realized chiefly through fewer and less costly fittings. The bus designs developed permit repetitive use of the same fittings to a greater degree. This allowed purchase of large quantities and savings through quantity discounts.

The initial idea was to develop a bus conductor with flat surfaces to be bolted to the caps of bus insulators and tapped with low-cost fittings, such as terminal lugs. A T-shaped aluminum member was first proposed but then abandoned as the aluminum angle had better possibilities. With two outside flat surfaces perpendicular to each other, one can be bolted against the cap of an insulator with terminal lugs, bars, or other angles fastened to the other surface.

While handbooks and catalogues listed many structural angles of 6061-T6 and 6063-T6 aluminum alloy, few sizes were stocked by suppliers. A 2½x3½x¼-in. angle of 6063-T6 aluminum alloy and a carrying capacity of 1,200 amp was selected as the best obtainable from suppliers' stocks. Three new substations were built, with this angle for the low voltage bus.

Soon after the first designs were completed a new angle bus conductor, extruded of No. 2EC-T6 alloy and called "Universal Angle Bus Conductor" (UABC) became available. It has equal legs of 3¼ in., its ¼-in. thickness is uniform, and its capacity is 1,300 amp. Indentations on the surfaces assist in positioning the holes. Conductor connections, using the standard NEMA 1¾-in. hole spacing, can be made to either leg. The 2½x3½-in. structural angle required an

Aluminum Angle Costs*

	Circular Mils 336,400	954,000	UABC	Bolted Fittings 1½ in. Tube	2 in. Tube
Material	98	219	105	189	210
Labor	30	30	30	25	25
Total	$128	$249	$135	$214	$235
Ampere Capacity	405	785	1,300	925	1,150
Cost, X Bus/Angle	95%	184%	100%	157%	174%

* Costs of 3 phase bus in 12 ft bay; all material, including one tap footing per phase but no splice fittings.

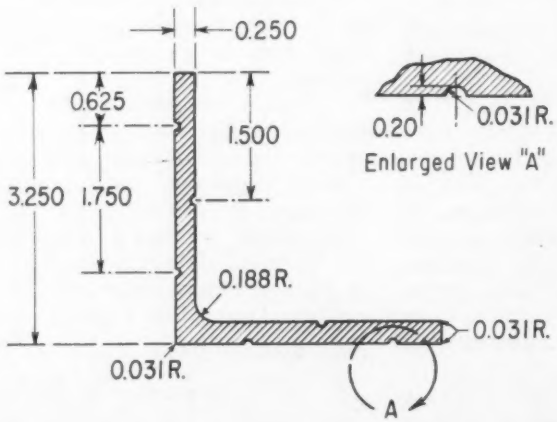
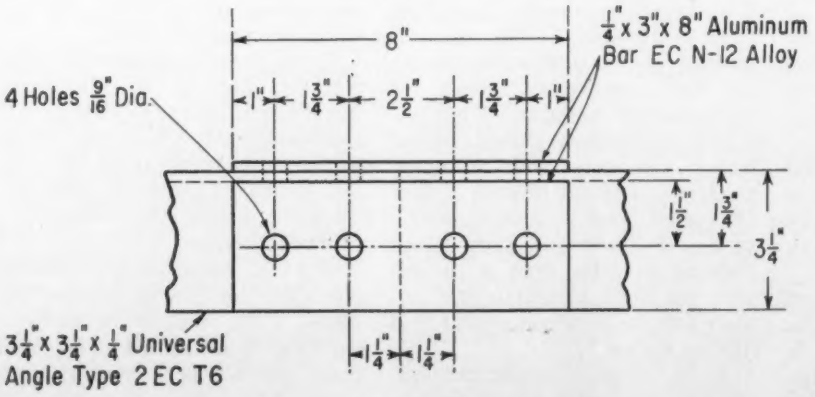


FIG 1—INDENTATIONS on surfaces help position mountings and tapping



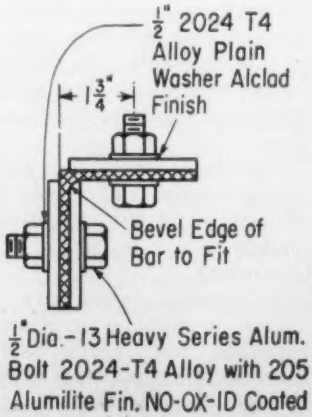

½" 2024 T4 Alloy Plain Washer Alclad Finish
1¾"
Bevel Edge of Bar to Fit
½" Dia.-13 Heavy Series Alum. Bolt 2024-T4 Alloy with 205 Alumilite Fin. NO-OX-ID Coated

FIG 2—SIMPLE CONSTRUCTION is a feature of aluminum angle bus, and its economy results from elimination of fittings

adapter for a four-bolt connection to the 2½-in. leg. For the same cross-section the No. 2EC-T6 alloy has greater capacity than either of the other alloys.

Economy of the angle bus construction results from elimination of expensive insulator and conductor and connection fittings. Elimination of insulator support fittings and the use of simple, inexpensive, readily available conductor connectors is practicable with the angle bus. The terminal lugs are identical to those on equipment pads elsewhere. Bus splices became simple connections using flat aluminum bar, and expansion joints of the same bar have a semi-circular section.

The angle bus installation for 13.8-kv buses in 12-ft bays costs 105% of the 336.4-MCM all-aluminum strain bus, 54% of the 954-MCM all-aluminum strain bus, and 58% of the 2-in. standard aluminum tubing bus. Current-carrying capacity of the angle bus is 1,300 amp, which is 325% of the current-carrying capacity of the 336.4-MCM all-aluminum bus, 160% of the current-carrying capacity of the 954-MCM all-aluminum bus, and 110% of the capacity of the 2-in. aluminum tubing. Design costs were reduced by development of standard drawings.

To indicate the mechanical capability of the UABC in a 12-ft span with the conductors spaced on 2-ft centers, a 20,000 amp 3-phase symmetrical fault can be withstood in addition to a load of ½-in. ice and a 9-lb wind. At 13.8 kv this represents a 480-Mva fault. With the conductor spacing increased to 3 ft. the fault capability is 25,000 amp or 600 Mva at 13.8 kv.

Mechanical capability of the 3¼-in. angle is shown in Fig 3. The condition of the 12-ft span used in standard NSP substations permits a force of 62 lb per ft. For a 15-ft span, 40 lb per ft is permissible, and for 20 ft, 22.5 lb per ft.

These figures were translated into forces caused by short-circuit stresses in Fig 4. To have the calculated values fall on straight lines, the curves were plotted on log-log paper. Bus span figures are based on limiting forces in the Fig 3 curve. From the Fig 4 curves the short-circuit capability in amperes for various spans and conductor spacings can be determined.

Capacity of the 3¼x3¼-in. angle is 1,300 amp on a 70C conductor temperature basis. On this basis, on a 3-phase system, the 3¼x3¼-in. UABC can handle 30 Mva at 13.8 kv and 10 Mva at 4.160 kv. At 23 kv, the same angle carries 50 Mva; at 69 kv, 150 Mva.

As No. 2EC-T6 alloy is not adversely affected by annealing when operated continuously at 100C, it appears reasonable to consider higher design temperature limits than 70C. When generous splices are used and care taken to avoid transmitting heat into heat-sensitive equipment, it seems reasonable to design toward the handling of transient overloads or emergency loadings which might result in bus temperatures of 80 or 85C. This would indicate an increase in permissible loading on the 3¼x3¼-in. UABC.

Although the aluminum angles have been used only for 23 kv and lower voltage substation buses, they are considered suitable for designs 69 kv and higher. At 115 kv, corona problems would have to be considered, and, the 3¼x3¼-in. UABC might not allow long spans.

From this data, suitable spans and spacings for the various voltages, normal load, and emergency requirements can be determined for either the 3¼x3¼-in. angles, or the 6x6-in. angles.

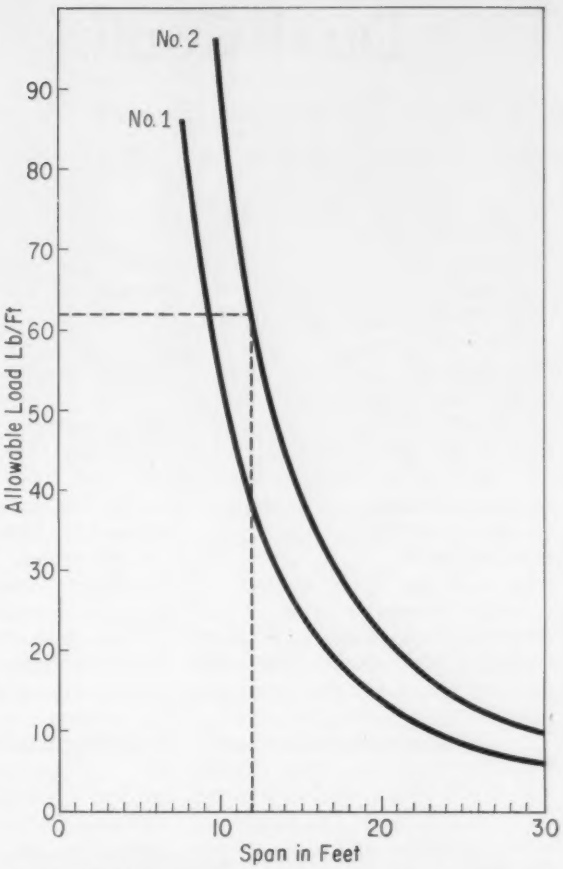


FIG 3—MECHANICAL CAPABILITY of angles determines the permissible spans for given spacings and for design loads

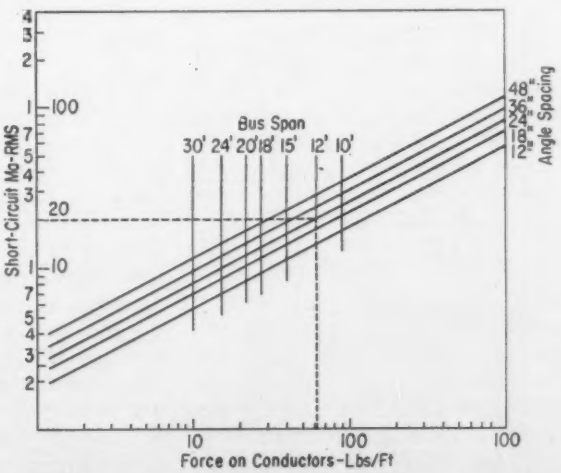


FIG 4—SHORT-CIRCUIT CAPABILITY of 3¼ x 3¼-in. angles is figured from data on mechanical capability in Fig 3

Dual Cooling Ups Bank Rating for

Each of two 200-Mva transformers adapts for handling output of two 325-Mva units at PE's Eddystone Station

E. J. KELLY, Engineer, Electrical Engineering Division Philadelphia Electric Co, Philadelphia, Pa.

T. H. PROGLER, Application Engineer, Allis-Chalmers Mfg. Co, Milwaukee, Wis.

In selecting generator transformers for Eddystone Station, Philadelphia Electric Co sought to minimize the loss of system economy due to reduced plant output when a transformer fails. Eddystone will have two 325-Mw supercritical generating units.

To avoid an output cutback of one unit, two steps were taken. First, two 3-phase transformers operating in parallel were selected for each unit, rather than a single one. Secondly, new transformer cooling, known as dual-cooling was adopted.

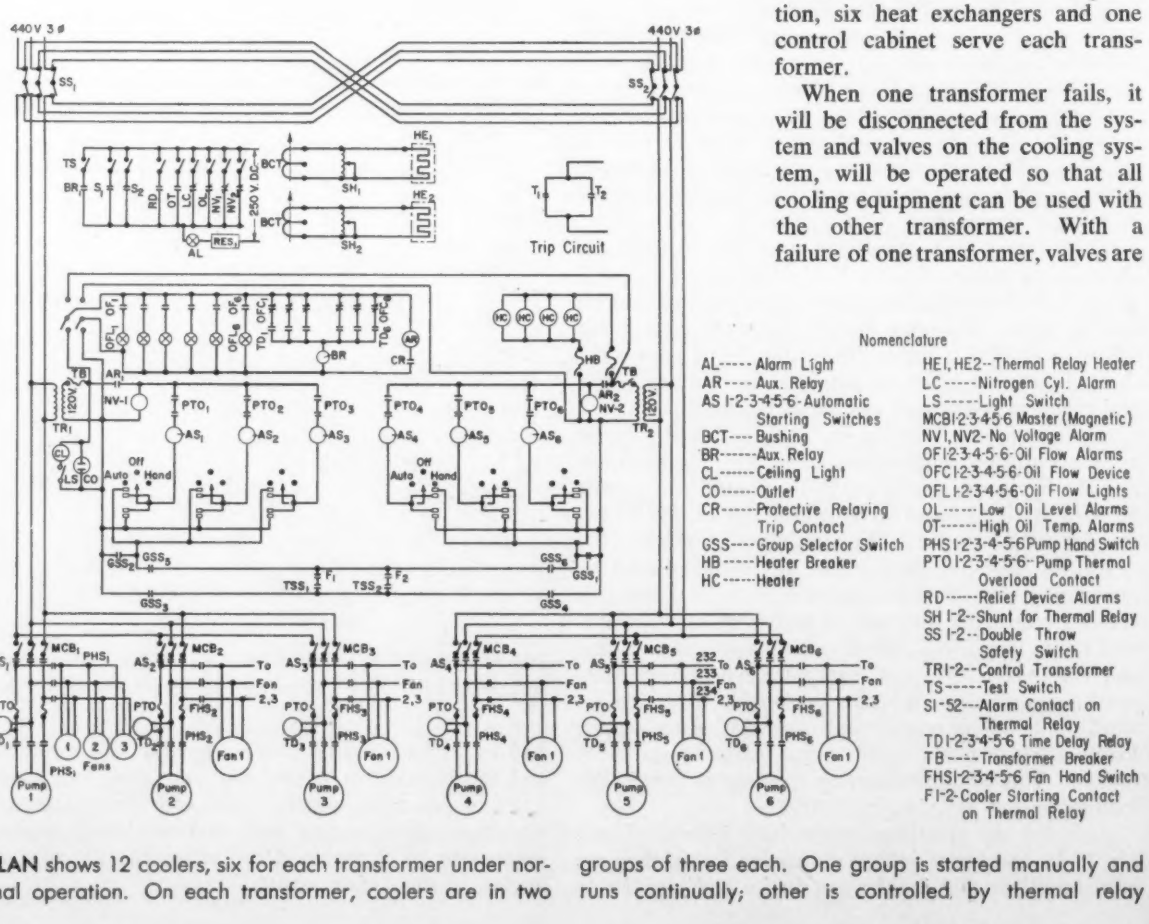
In the latter system, cooler of two paralleled transformers are mounted in two groups on piping between the transformers. The interconnection permits each transformer to use its own coolers under normal operation and the coolers of both transformers when one fails. Thus, emergency capacity of the remaining transformer is greatly increased.

The installation for Unit 1 will be the first of this type. The dual-cooled system has two 3-phase transformers, each rated 200 Mva using its own coolers. Using the dual-cooling, each has a 350-Mva capacity without exceeding a 55C average copper temperature rise and 65C hottest spot temperature rise. Thus the installation will deliver the full output of the generator to the system under normal and emergency conditions. Above the 350-Mva load condition, the transformer in service will be operated at emergency temperature, normal loss of life being permitted.

Centers of the two middle low-voltage transformer bushings are 95 ft apart as dictated by the turbine-generator mounting dimensions. Between the transformers are four 10-in. pipes supported by six columns. Size of the pipe assures adequate oil flow to the end heat exchangers in one-transformer operation. Expansion joints at each end of the 10-in. pipes simplify alignment and allow for expansion. The joints can withstand full vacuum.

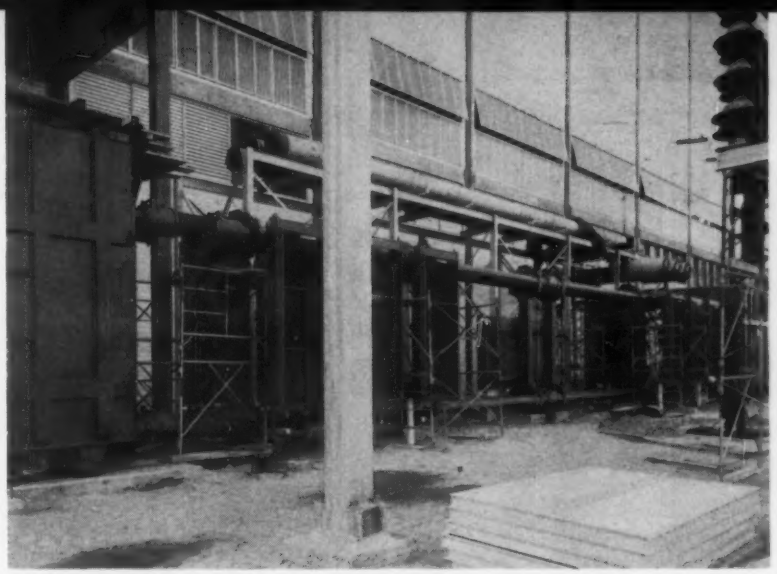
Except for minor revision in the control circuit, standard cooler units for forced oil-to-air-cooled transformers were used. There are 12 heat exchanger assemblies and two control cabinets. In normal operation, six heat exchangers and one control cabinet serve each transformer.

When one transformer fails, it will be disconnected from the system and valves on the cooling system, will be operated so that all cooling equipment can be used with the other transformer. With a failure of one transformer, valves are



PLAN shows 12 coolers, six for each transformer under normal operation. On each transformer, coolers are in two groups of three each. One group is started manually and runs continually; other is controlled by thermal relay

Emergency



200-MVA TRANSFORMERS for Eddystone Station will be interconnected by a dual-cooling system which uprates each to serve alone in an emergency

closed to remove it from the cooling system. After a check of the oil in the piping and coolers of this transformer, and, when necessary, cleaning of that equipment, other valves are opened so that the other transformer can utilize all the cooling equipment and carry more load.

The shutoff valves between the groups of cooling equipment in each pipe are normally closed. They are opened only when dual-cooling is needed. Two valves at the ends of each pipe permit removal of a transformer without draining the oil from the transformer or cooler piping.

Transformers are circular-coil, shell-form construction. Integral core-and-tank bracing reduces the size for ease of shipment and installation. The tank structure gives bracing and support for the core-and-coil assembly against mechanical stresses.

Design in Three Parts

The integral-design tank has three parts: The left or high-voltage section; the center section; and, the right or low-voltage section. The transformer cores are vertical when the units are upright, but in assembly, lie on their side. Each tank section provides coil-and-core bracing. The right and left sections hold and support the parts of the coils extending past the core, which is supported between the two sections and completely enclosed by the center section. High-voltage winding leads are directly connected to the bottom terminals of the 115-kv, oil-filled bushings in the upper left tank section. The neutral lead of the wye-connected high-voltage winding is brought out through a 15-kv bushing.

Dual-cooling necessitates a low-voltage current capacity in each transformer of 10,200 amp. The low-voltage winding leads are connected to a bus in the upper right tank section. Four sets of flexible connectors between the bus bars and the 10-in. dia bushing terminal stud afford contact surface for carrying very high current. Cooling equipment is self-contained and self-supporting. Each cooler has a totally enclosed motor-pump unit for circulating oil through a fan-cooled heat exchanger. Hot oil enters from the top pipes and passes through the heat exchangers. The cooled oil then passes into the bottom of each transformer.

There are 12 coolers in the arrangement, six for each transformer under normal operation, as shown in the drawing. For reliability in cooler operation there are two power supplies, two thermal relays, spare bushing CT's for the thermal equipment, and manual throwover of the cooler alarm circuit to either power supply.

On each transformer, the coolers are in two groups of three each. One group is started manually and runs continuously. The other is controlled by a thermal relay responsive to hottest-spot temperature.

A group selector switch permits selection of either group as the continuously running or thermally controlled set. The thermally controlled group can be started manually at any time. A thermal selector switch permits selection of either thermal relay for control of the second group of coolers. Switches SS_1 and SS_2 allow selection of a power source to feed both sets of coolers, or to let each source supply each set separately.

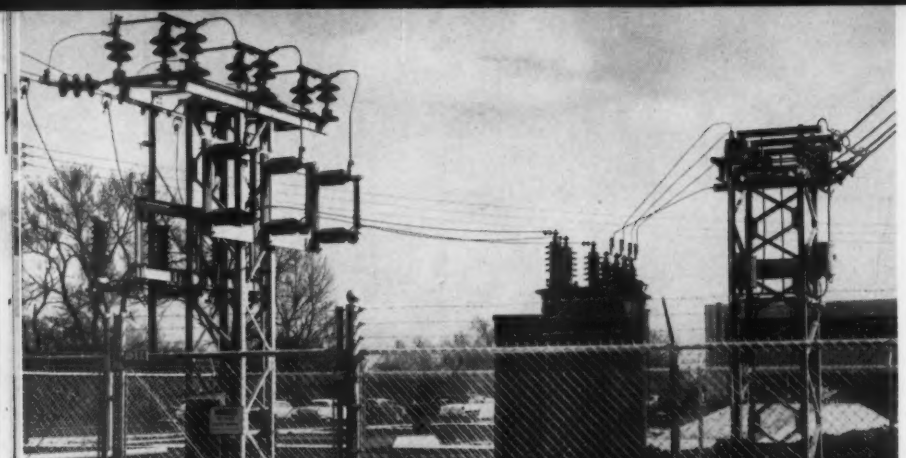
Loss of power to either cooler group is signalled by an alarm energized through the normally closed contacts of the undervoltage relays, NV_1 and NV_2, and by the running lights OFL_1 to OFL_6, which go out when contacts OF_1 to OF_6 open on loss of oil flow.

If any pump fails to operate when voltage is supplied to it, its OFC contact closes and energizes relay BR to sound the alarm. To prevent unnecessary alarms during start-up, time-delay relays keep the alarm from sounding for 30 sec after the pumps are energized. Relay AR prevents operation of the coolers when a transformer fails. During normal operation, it is energized through the contact of relay CR; AR_1 and AR_2 are closed. In the event of a primary relay operation, indicating a transformer failure, the contact of relay CR is opened, and relay AR is de-energized and its contacts open to remove control power, tripping the coolers off the circuit.

Prove Dual Cooling

When all cooling equipment is used for one transformer, the heat exchangers, which normally cool the second unit, are put on manual control and run continuously as long as the transformer is energized.

All cooling equipment and control equipment were tested with 95 ft of piping in place. Heat runs at both the 200 Mva and the 350 Mva loading conditions recorded the performance of transformer and cooling system. The heat runs not only proved the basic values of dual cooling, but illustrated the additional load-carrying capabilities of the system.



T-TYPE TOWERS are a feature of substation now being erected by Commonwealth Edison Co for industrial customers. They are the result of the company's search for design and construction methods allowing savings amounting to 25%

T-Type

Substations for industrial customers may be erected in 2½ to 3 days of field labor; shop assembly reduces cost

H. McCOMB, Distribution Engineering Dept, Commonwealth Edison Co, Maywood, Ill.

Both the design and construction methods for substations serving individual industrial customers have been modernized by Commonwealth Edison Co. The result is a saving

PRE-ASSEMBLED TOWER can be erected within 1 hr after arrival, when the concrete bases have been poured in advance. Here the secondary tower is in the process of erection, having been purchased factory-assembled

Structure Saves Time and Costs

in dollars and manhours and improved appearance of these substations, which means better relations with customers and public.

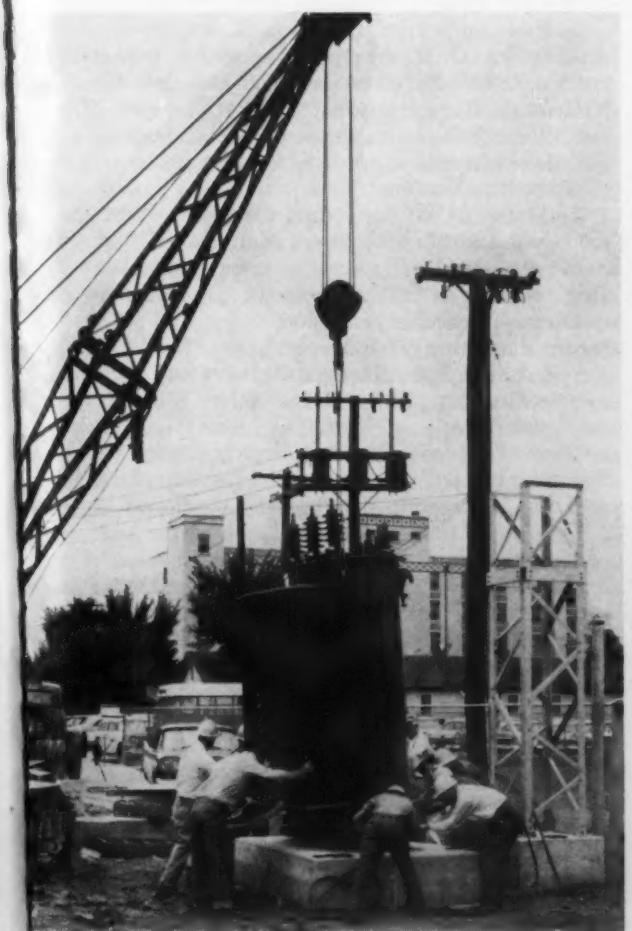
To combat rising costs, the company attempted to re-design the four-pole wood structures. With these structures a considerable amount of field labor was required in digging holes, setting and framing poles, and mounting timbers, equipment, and wiring. Comparative estimates and designs showed a saving of 25% in favor of T-type steel-tower substations.

Several T-type installations have been made, including those at stations with three single-phase transformers; one with 3-phase transformer; and, three with single-phase transformers with metering on the secondary structure. Actual costs results produced the anticipated savings. The steel substations can be installed in 2½ to three days of field labor, compared with ten to 14 days for the wood-pole structures.

The primary tower is 16 ft 6 in. high; the secondary tower 12 ft 6 in. high. The former is used for an overhead takeoff and is adaptable to an underground supply by addition of an outrigger for the power cable terminal.

Towers are purchased with the body of the "T" factory-assembled. The air break switch, its operating mechanism and supporting steel are mounted on the tower at Commonwealth Edison's shops where adjustments are made to assure proper working of the switch. Then the switch, with its supporting steel, is removed for shipment to the site.

Concrete foundations are poured and grounds are installed in advance. Towers and transformers are set with a mobile crane. This work takes about 1 hr after arrival at the site. Arresters, fuses, and wiring are then installed.



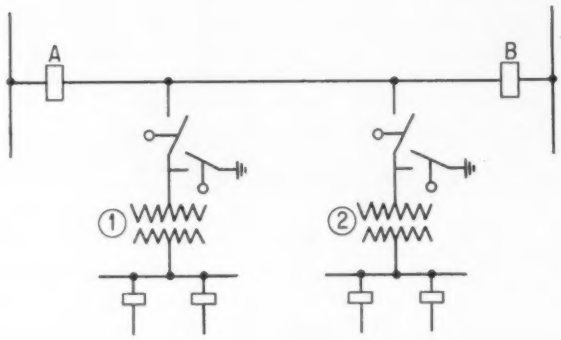
TRANSFORMER is being transferred from the lowboy trailer to its previously prepared pedestal at customer's site

"T" of the primary tower, with disconnect switches already assembled, is moved into place to be secured by work crew

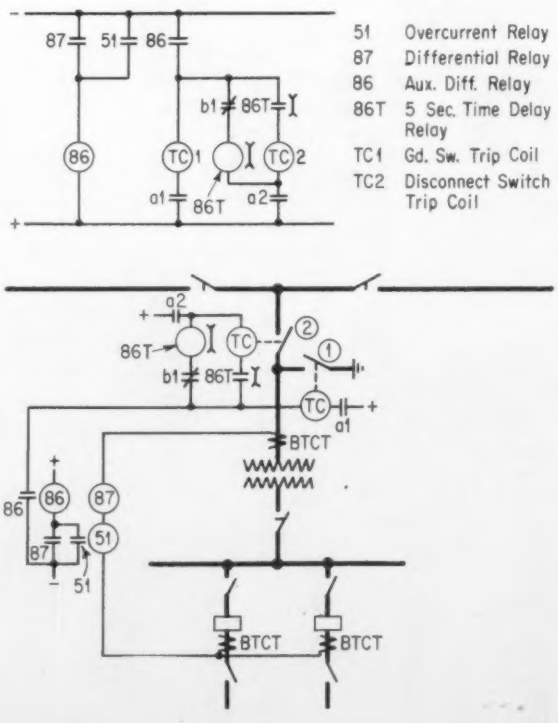
Expulsion Breaker Protects

Georgia Power Co develops a breaker which utilizes the expulsion-tube principle to protect transformer banks connected to the 115-Kv subtransmission system

HENRY H. STROZIER, Asst Chief Planning Engineer, Georgia Power Co, Atlanta, Ga.



COMBINATION ground and disconnect switch has no bypass. Clutch permits operation without moving switch blades



PROTECTIVE RELAYING of the combination switch is accomplished by use of differential and overcurrent relays

To prevent extended line outages and provide a low-cost means of high-side protection for power transformers, Georgia Power Co is using two schemes. One combines grounding and disconnect switches, both spring operated; the other is a 3-phase, expulsion circuit breaker that utilizes the expulsion-tube principle to extinguish an arc. This breaker was developed by the company to eliminate the short interruption in service occurring when the combined switches operate.

The company installed its first single-phase grounding switch in 1946 at a substation supplied by a 115-kv line, having oil circuit breakers at each end. Only one substation was connected between the OCBs, so that only its service was affected by a transformer fault. By removing the fault manually, the line could be re-energized.

Removes Fault Automatically

Later, when more than one substation was tapped to a line section, a spring-operated fault-disconnecting switch was added to remove the fault automatically, thus maximizing service continuity. This addition led to development of a combination spring-closing ground switch and spring-opening disconnect switch.

In operation for an internal fault, not protected by the low-side OCB, the grounding switch trip coil is energized by a differential relay. This grounds one phase of the line and trips the OCBs at both ends of the line. Then 5 sec later, while the line is de-energized, the disconnect switch trip coil is energized to remove the fault from the line.

To assure that the line is dead when the switch opens, the 5-sec delay is coordinated with the OCB operations. Both breakers are set to open instantaneously. One recloses immediately. If the fault remains, it reopens and waits 15 sec before the second reclosure. During this period the disconnect opens. After the OCB second reclosure, the relays at the other line end check for synchronism and then reclose their OCB, restoring through service.

These operations adequately protect the transformer bank, but involve a 15-sec line interruption. To eliminate this interruption the company developed an expulsion circuit breaker for installation on the high side of transformers connected to transmission lines. It is a 3-pole assembly, each pole supported on three insulators secured to a common steel frame. An insulator at both the top and bottom of each pole supports a contact for the expulsion tube and terminal. The rotating insulator at the bottom is for the operating crank.

A standard fiberglass fuse tube of ½-in. bore, horn-fiber lined, is used for the expulsion tube. In its top is contact hardware for holding the upper part of the interrupter and handling eye. Hardware in the lower end consists of an operating pin and pulley, interrupter link terminal, and hinge pin.

The first interrupter link comprised sliding contacts attached to flexible cables. One cable attached to the top contact hardware; the other cable was threaded around the pulley and secured to the lower contact hardware, so that the pulley and operating pin were in

the raised position. In operation, the crank forces the pin and pulley down rapidly. This movement shears a pin running through the contacts and separates the interrupter. Expulsion action of gases generated in the tube extinguishes the arc.

Breaker Not Reclosing

Each pole of the breaker operates similarly from its bell crank connected to a horizontal rod, which is latched against a spring. When the trip coil is energized, the connecting rod is forced to the right, turning the three rotating insulators and, in turn, opening the three interrupters simultaneously. After operating, the expulsion tubes are removed, the connecting rod mechanism is relatched by means of an operating handle and vertical shaft, and new tubes are installed.

The expulsion breaker is not reclosing. Its use on the high side of transformers does not require rapid reclosing because faults that would cause it to operate are usually permanent.

The first expulsion breaker was installed three years ago on the 115-kv side of a 3-phase, 20-Mva transformer, which supplies a bus and two 46-kv feeder OCBs. The expulsion breaker is tripped by three differential or three overcurrent relays connected to bushing-type current transformers on the 115-kv side of the transformer and on two of the 46-kv OCBs.

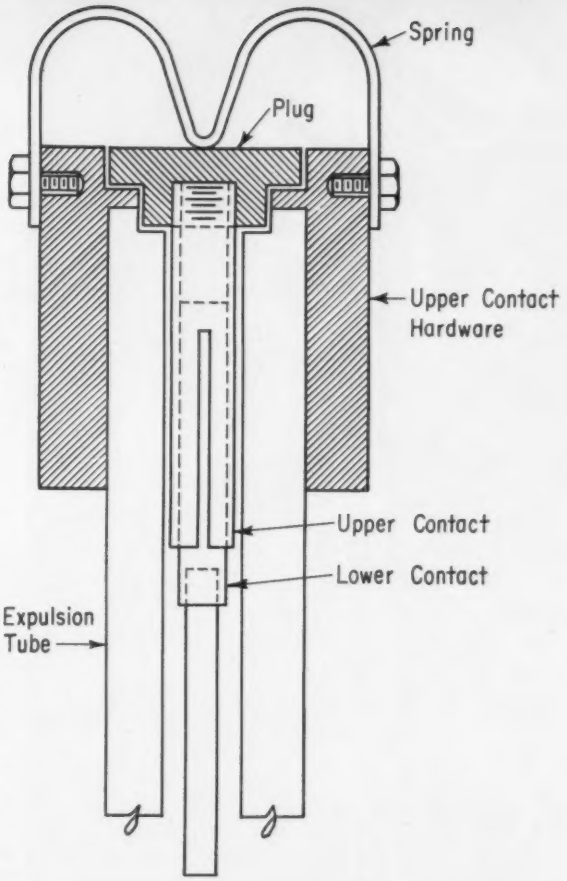
To check the breakers' interrupting ability, a series of tests were conducted imposing the maximum fault current possible at the delta-wye connected transformer. By placing a phase-to-phase short on the line side of one 46-kv OCB, fault currents on the 115-kv line were 520 amp in one phase and 260 amp in the other two.

Under these fault conditions, different tube sizes and interrupter links were tested. Tubes of ¾-in. bore, with the interrupter in the center, interrupted transformer charging current with ease, but not the fault. A ⅝-in. bore tube with the interrupter in the top, which was plugged, worked satisfactorily; films show an arc interruption about 3 cycles after contact separation. Similar results were obtained with a ½-in. tube. Thus, for successful operation, the tube must have a small bore and be plugged at the top to control gas velocity.

These conclusions resulted in a refined tube and interrupter arrangement. The top contact of the new interrupter, made of spring copper tubing, is mounted in a plug that closes the top of the ½-in. expulsion tube. Holding the plug in place is a heavy spring that allows top venting for heavy faults.

The lower interrupter contact is made of copper rod and has a flexible copper cable which threads around the pulley and attaches to the lower tube contact. To seal the bottom of the tube and prevent weathering of the liner, a plastic stopper is fitted around the flexible cable. This stopper is withdrawn when the cable starts to move down, so that the lower end of the tube is open to allow expulsion action.

After operation, the expulsion tubes do not drop out. This is desirable to prevent arc tracking. But to accomplish the same result an automatic disconnect switch may be installed ahead of the breaker, which will increase the cost of the installation to about $5,000.



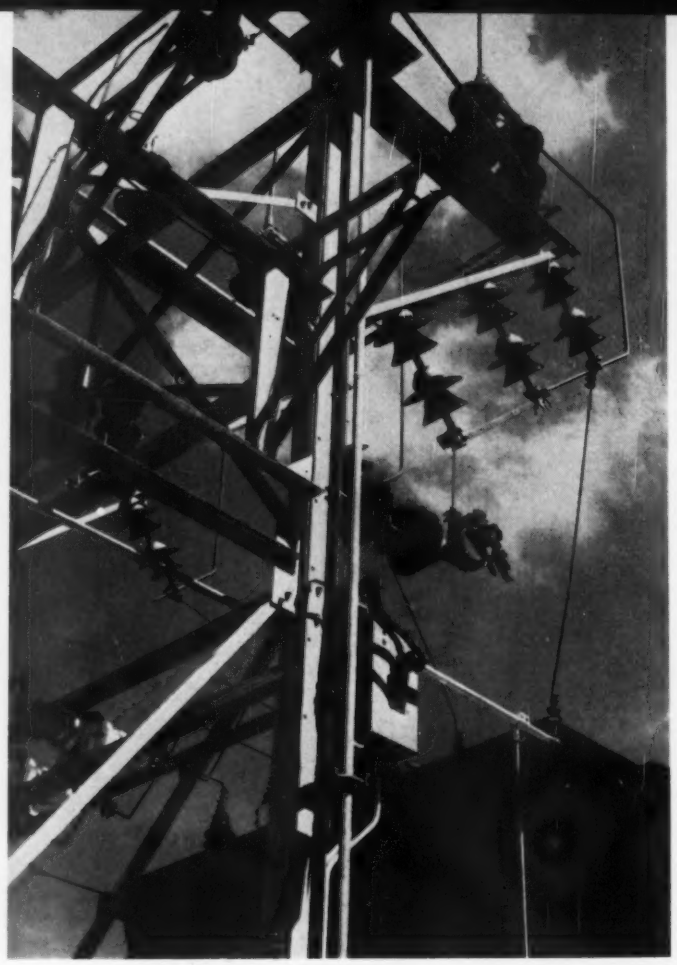
EXPULSION BREAKER has an interrupter in each of three poles that is opened by the spring-loaded mechanism

During the past three years the expulsion breaker has not operated other than for tests. These limited tests nevertheless indicate that the device is suitable for high-side protection. Of course, future use at 115 kv will depend on experience with the present installation. At 46 kv an installation is planned, and the breaker appears suitable for use on the 20-kv system.

Ground Switches Installed

Until the breaker proves superior, the company will continue installing grounding switch schemes. At present, 16 grounding switches and 13 combination ground and disconnect switches are on the 115-kv system, and two more combination switches on the 230-kv system. These have operated twice for faults and five times accidentally during testing. In all cases, the equipment functioned properly.

As a result of this experience, practically all new tapped substations larger than 2,500 kva and served at 20 kv or higher will probably be protected by the combination switches. All these 3-phase transformers are being purchased with high-voltage bushing CTs for relaying.



Automatic Ground Switch Protects Tapped Substations

Ground switch protection scheme is designed for old or new distribution substations which do not have high-side breakers

REID T. CULBERSON, Engineer, Florida Power & Light Co, Miami, Florida

Distribution substations tapped off transmission lines on the Florida Power & Light Co system are afforded positive protection against local faults through a standardized ground switch protection scheme. Of the several solutions possible, this scheme was chosen because of its economy, simplicity, flexibility and dependability. In addition, the scheme may be adapted easily to older stations, offers an installation standard, presents minimum operating problems, and requires a minimum of maintenance and testing.

Detection Distance Predetermined

The scheme is being applied to distribution tap substations which do not have a high-side oil circuit breaker. The transmission line feeding the substation may also supply other distribution substations. The load-side breaker on this line has relays set to detect faults up to a predetermined distance on the basis of calculated line impedance.

There may be cases in which the substation transformer impedance is less than the calculated impedance, for which the line relays would operate for local faults. However, in many cases the transformer impedance is higher than the remaining line impedance and the relay will not protect the tapped stations.

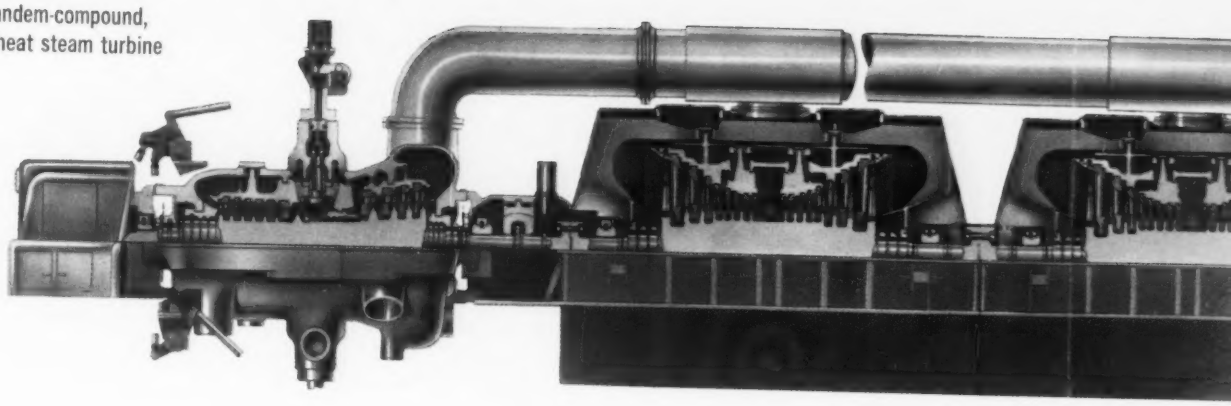
Among the schemes investigated were a differential scheme or a complete fault bus scheme tripping the remote line relay, and the use of a high-side breaker. The method selected is a combination of overcurrent protection and a modified fault bus. It uses four local sensing devices to initiate the closing of the ground switch and the opening of a transformer disconnect switch.

The combination protection scheme operates in this manner. When a local fault beyond the reach of the line relay is detected by one or more of the sensing devices at the distribution substation, two control circuits are actuated. One control circuit will electrically trip to close a single-pole ground switch to place a short circuit on the transmission line. This ground switch is between the power-transformer high-voltage bushing and the transformer disconnect switch. The short circuit will trip the remote oil circuit breakers to isolate the line. After one instantaneous reclose the breaker locks-out; total clearing time is about 35 cycles with a 5-cycle breaker.

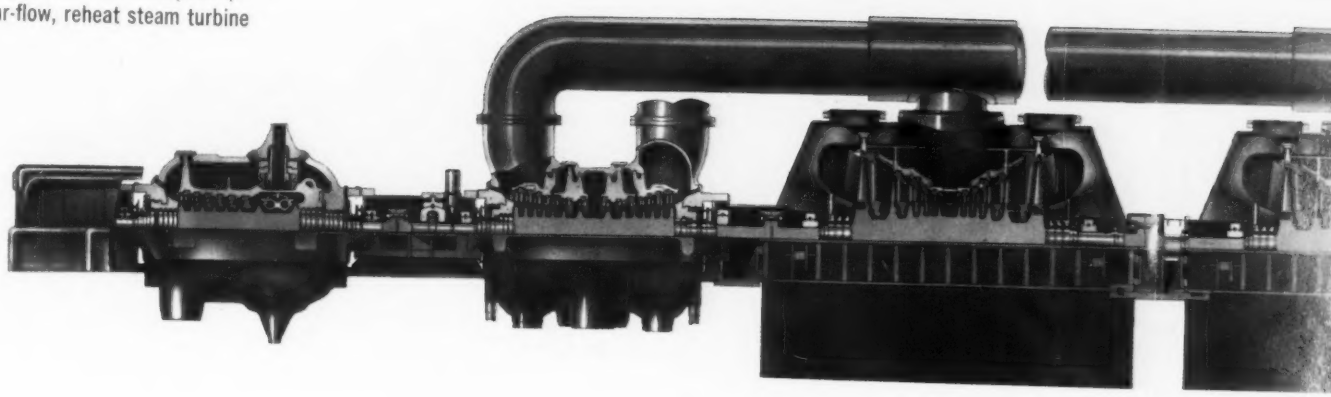
The second control circuit opens the transformer disconnect switch, a motor-operated three-pole gang-operated disconnect switch. As it takes about 3 to 5 sec to open, the disconnect switch will open after the transmission line has been de-energized. After this operational time, the operator may close in the remote breaker to pick up the remaining substations on the line. The faulted substation will not be detected until

(*Continued on page* 77)

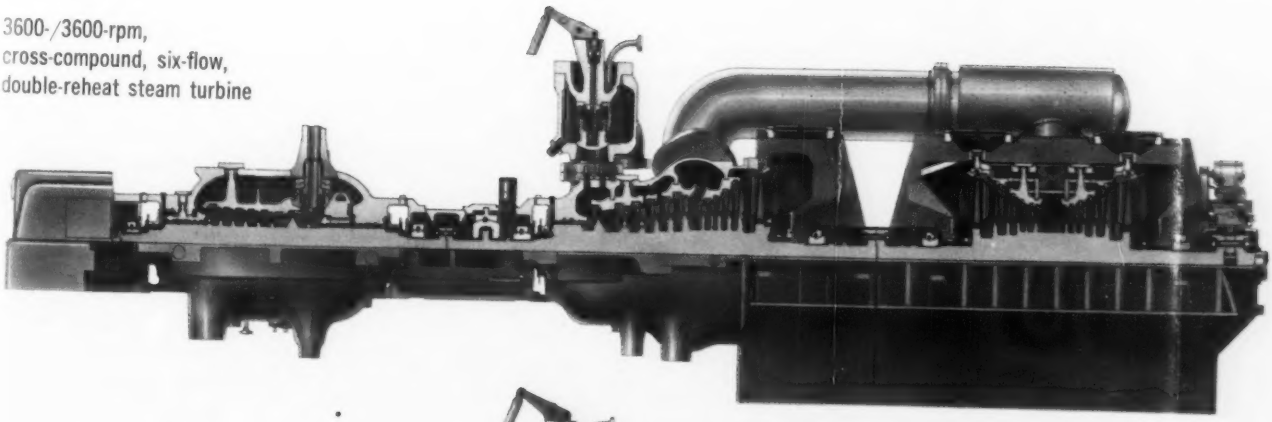
3600-rpm, tandem-compound,
four-flow, reheat steam turbine

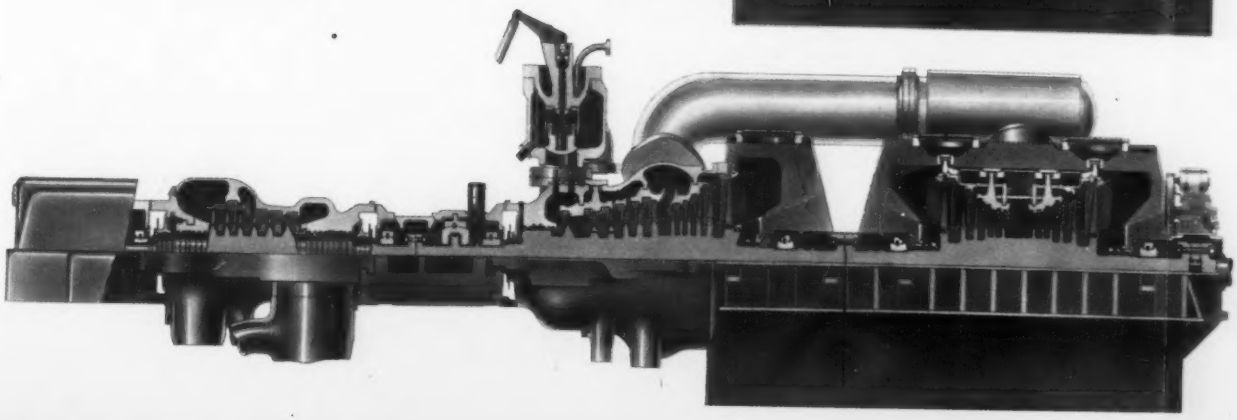


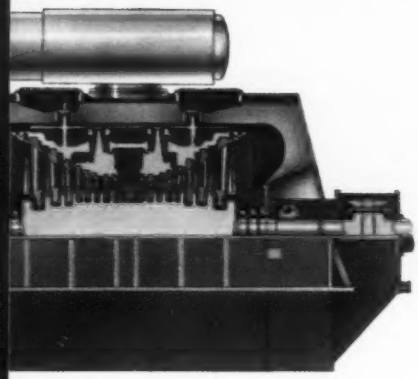
3600-rpm, tandem-compound,
four-flow, reheat steam turbine



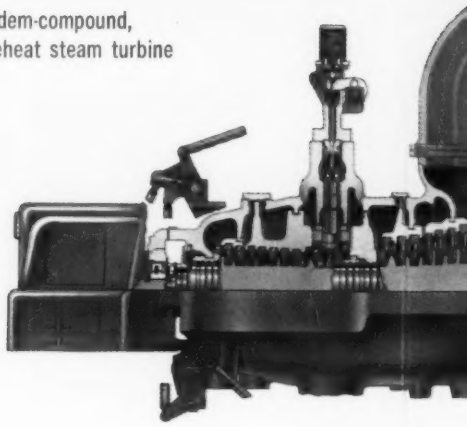
3600-/3600-rpm,
cross-compound, six-flow,
double-reheat steam turbine

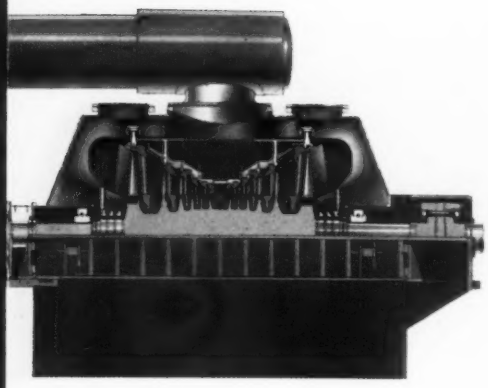




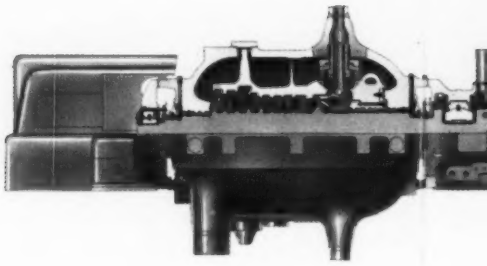


3600-rpm, tandem-compound,
double-flow, reheat steam turbine

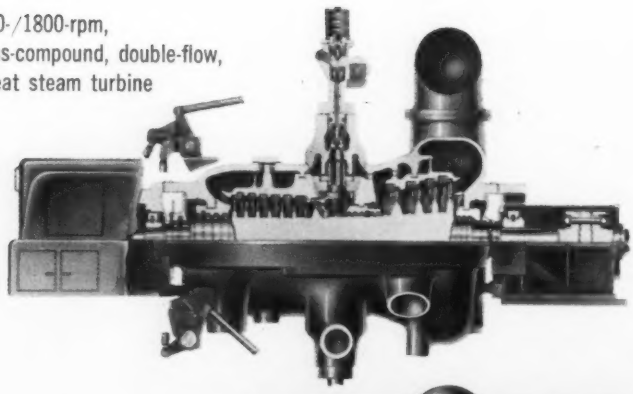


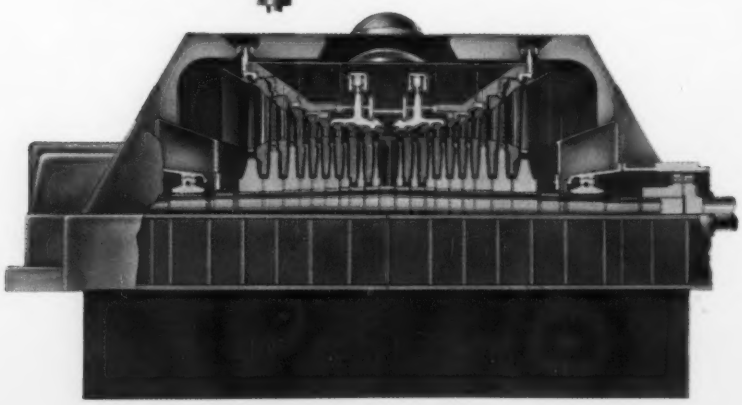


3600-rpm, tandem-compound,
triple-flow, reheat steam turbine

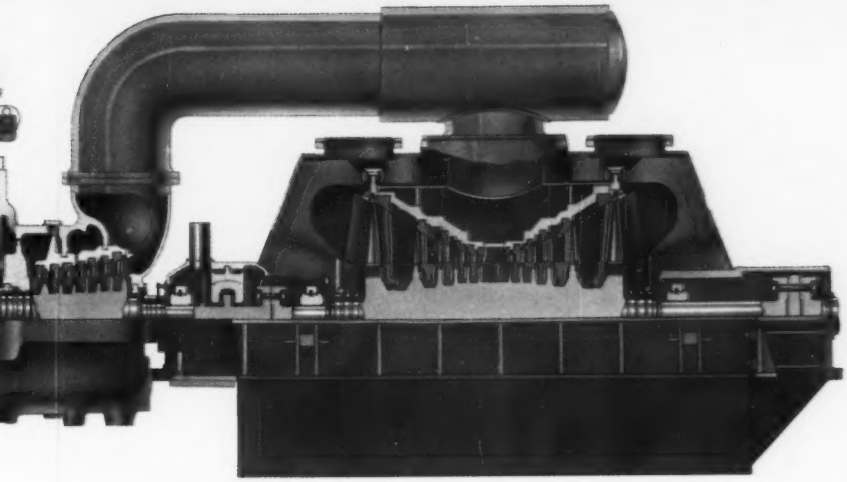


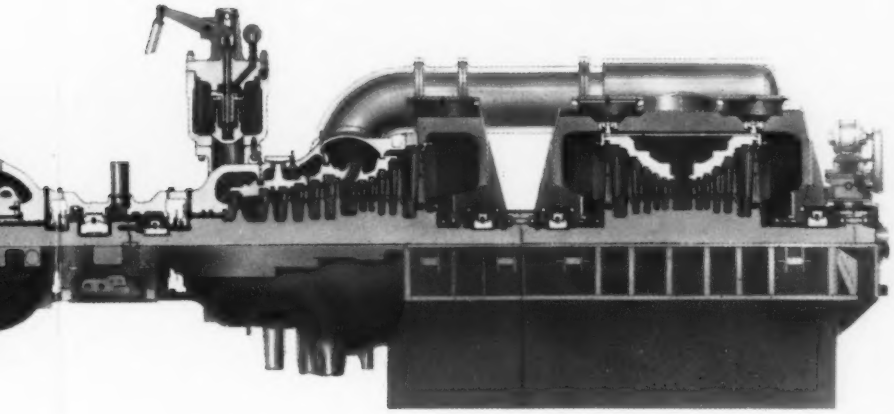
3600-/1800-rpm,
cross-compound, double-flow,
reheat steam turbine



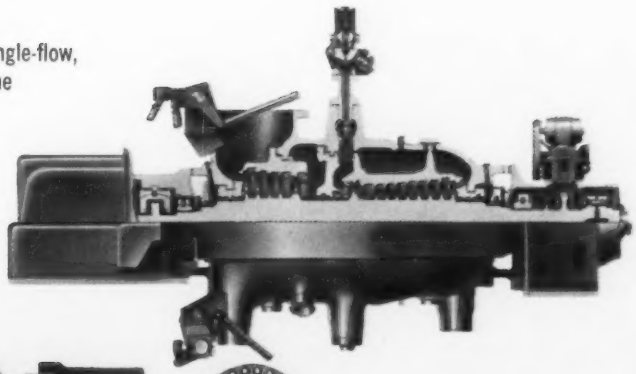


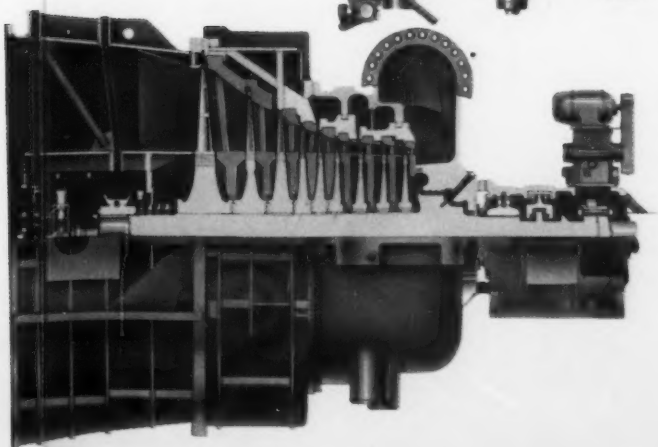
3600-/1800-r
cross-compou
reheat steam





3600-/1800-rpm,
cross-compound, single-flow,
reheat steam turbine





Pre-engineered Steam Turbines for the '60's

100,000 to 600,000 kw

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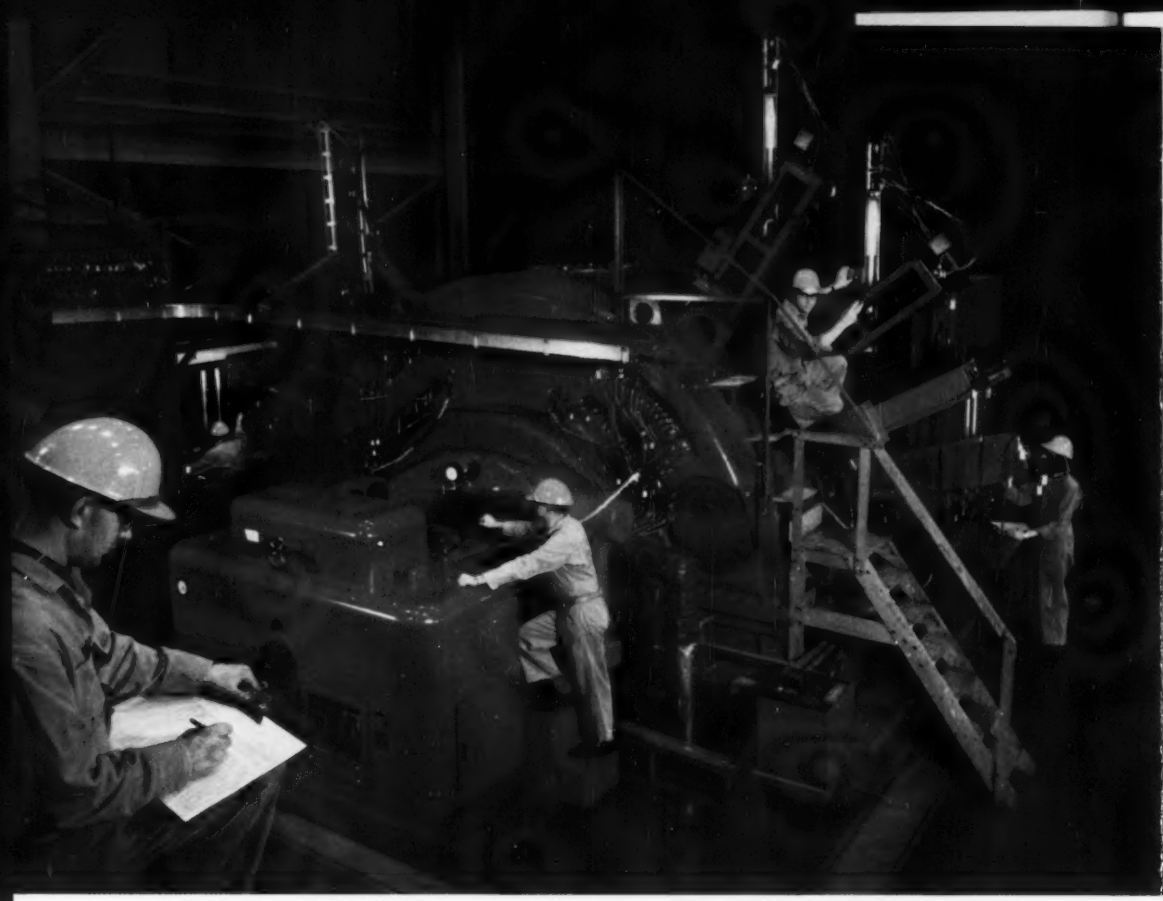

Why General Electric Offers More For Your Steam Turbine-Generator Dollar Investment

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General Electric's progress in attaining higher operating pressures and temperatures and increased component efficiencies is helping to assure further improvement in the coal rate of electric utilities. With the ever-increasing demand for improved performance, a continuous and diversified program of product development is being carried on in the company's research and development laboratories.

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General Electric's intensive basic research and development, sound engineering design, modern manufacturing techniques and proper operating practices contribute to the reliability of large steam turbine-generators.

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Completely integrated service—from initial order throughout the unit's operating life—is part of the "added value" purchased with each General Electric steam turbine-generator.

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Improved performance, greater reliability and completely integrated service mean more economical generation of electricity.

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As another step in its continuing progress to help electric utilities keep electric power America's greatest bargain, General Electric is introducing seven advanced-design, pre-engineered steam turbines specifically designed to meet electric generation requirements in the '60's.

The engineering features incorporated in these units—for top reliability, high performance and maximum simplicity—are the result of over 50 years of intensive research and development coupled with bold planning, engineering enterprise and close cooperation with electric utility companies and consulting engineers.

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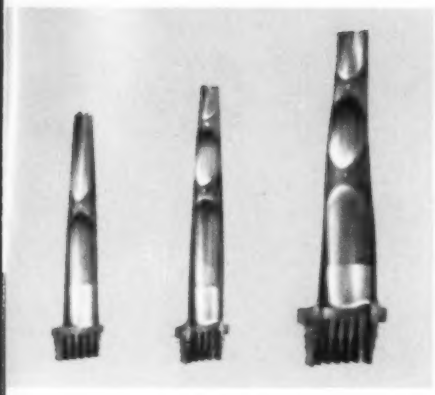
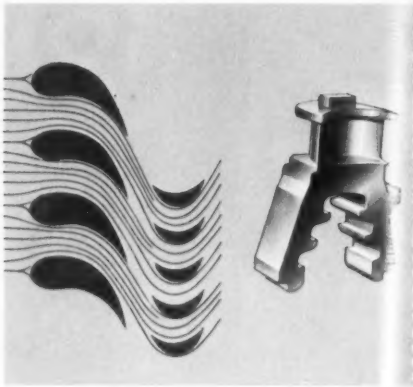
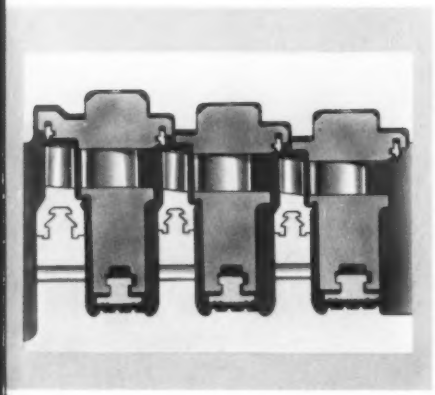
Important Evaluation Features Of General Electric Pre-Engineered Steam Turbines . . .



Progressive Bucket Design

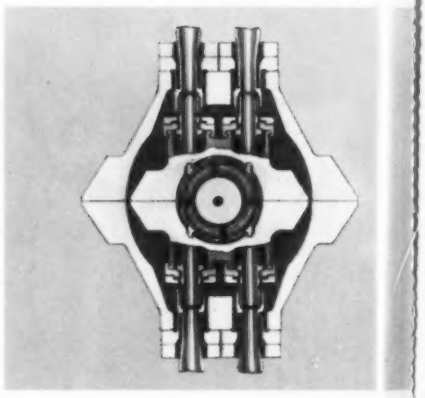
Impulse-Type, Solid Rotor Construction





Removable Radial Spill Strips and Spring-Backed Shaft Packing

Nozzle Box Construction



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Automatic Ground Switch Protects Tapped Substations (*Continued from page 70*)

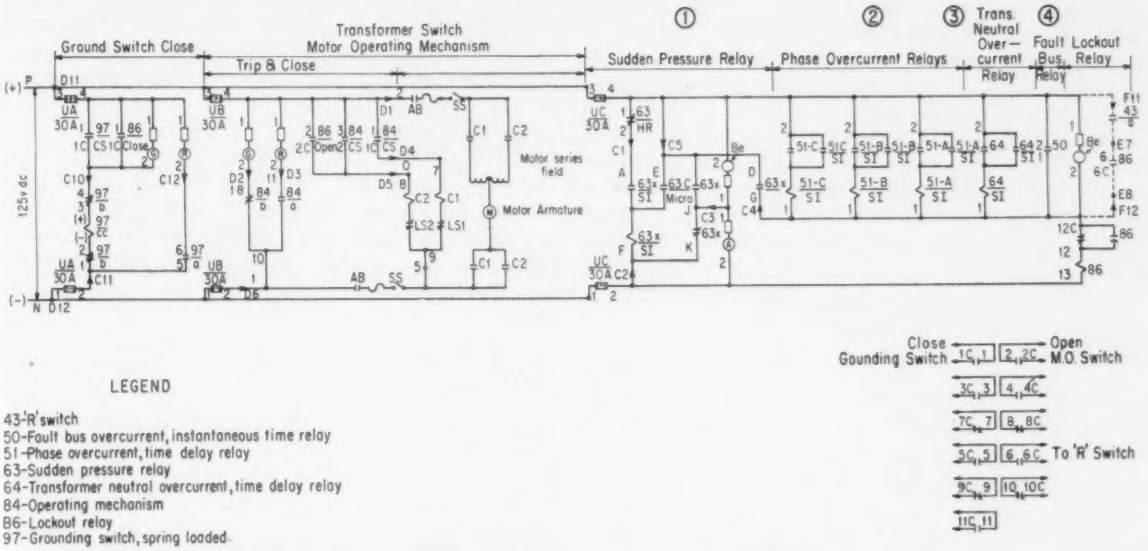


FIG 1—FOUR SENSING DEVICES are used to initiate closing of the ground switch and transformer disconnect for local faults. Unit relay and wiring plan is based on each substation power transformer requiring one complete unit

customers notify the company through trouble calls.

Four types of sensing devices actuate the closing of the ground switch and opening of the transformer disconnect switch. First is a transformer sudden-pressure relay, which operates instantaneously on any internal fault. A sudden-pressure relay is installed on each power transformer. For several oil-sealed transformers, on which the gas-operated sudden-pressure relay would not work, the standard control circuit was revised for an oil-operated sudden-pressure relay. The revised circuit provides an alternate standard for all oil-sealed transformers.

Second device is phase overcurrent relays, which are connected to the secondary of CT's mounted in series with phase conductors. Current transformers are located as close to the power transformer as possible; for new transformers they are in the bushings. Relays are time-delay type to allow feeder breakers to operate for feeder faults and also to provide backup for the feeder breaker. Third sensing device is similar to the second except the CT is in the power transformer neutral. This relay is more sensitive than the phase relays but only pick-ups for phase-to-ground faults. It also is a time-delay type to backup the feeder breaker.

The fourth method is a fault bus. Under phase-to-ground fault conditions, faulted equipment is considered a bus with the current from this bus restricted to a certain path to ground. In this path a through-type CT is introduced, with its secondary connected into an instantaneous relay. Flash-over of a bushing on any equipment would cause this relay to pick-up.

As this ground-switch scheme was new to Florida P&L, all requirements for equipment had to be calculated. Because this scheme was to be installed in existing stations as well as all new stations, a standard type of installation was desired. Ground switch spec-

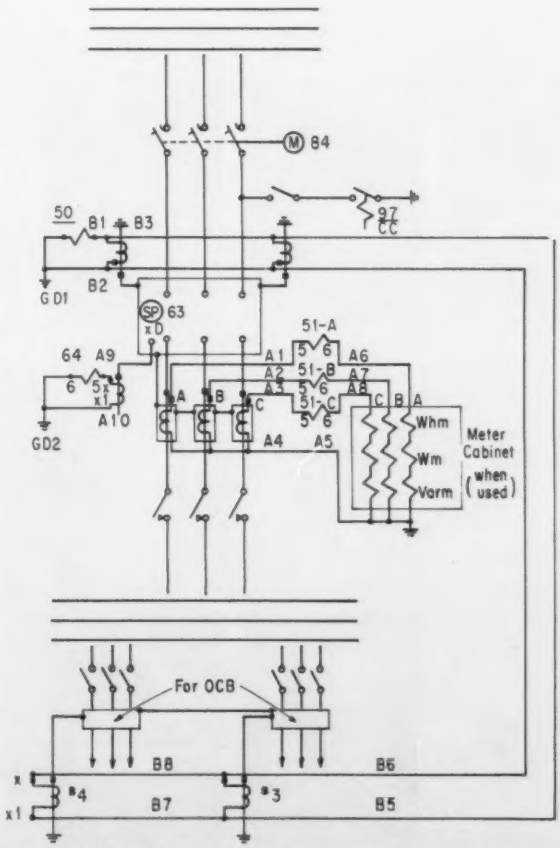


FIG 2—GROUND SWITCH between transformer and disconnect is closed to trip remote breaker. Total clearing time is about 35 cycles with a 5-cycle breaker. The disconnect switch is opened only after the line has been isolated

ifications were prepared for vendors; motor operators and CT's are standard equipment. A unit relay elementary and wiring diagram with a panel arrangement and outdoor cabinet was designed. This unit is based on each power transformer requiring one complete relay unit. All possible extreme conditions were calculated so that this unit and its relay could be installed at any location without changes.

Current transformers were sized for all expected conditions. A standard size was then established for the widest range of power transformer kva ratings. Special sizes are required in some locations because of a neutral resistor or a transformer of low kva rating. As a result of choosing relays with a certain range of setting and establishing the CT sizes, the ground switch program electrically is a standard.

The fault-bus portion of this scheme requires that equipment be insulated from the ground bus, except for the desired electrical tie. In all applications it was determined that a concrete foundation would provide sufficiently high resistance to effectively isolate this equipment. Where outdoor CT's are used, this equipment is insulated from the steel structure using special insulating washers and sleeves.

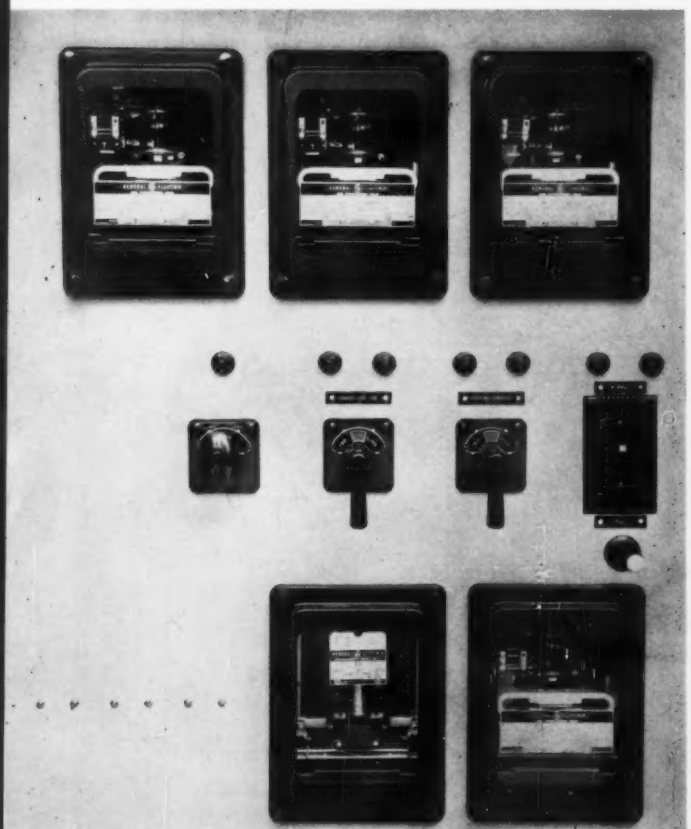
These washers and sleeves must have electrical properties to withstand an impulse voltage while the fault bus relay picks-up. Physically they must withstand mounting compression, weather and sun damage. Steel conduits to all the equipment are spliced with a nonmetallic conduit. To provide a standard physical arrangement for all required equipment, standard drawings were prepared indicating a position applicable to all old and new stations.

32 More Installations Planned

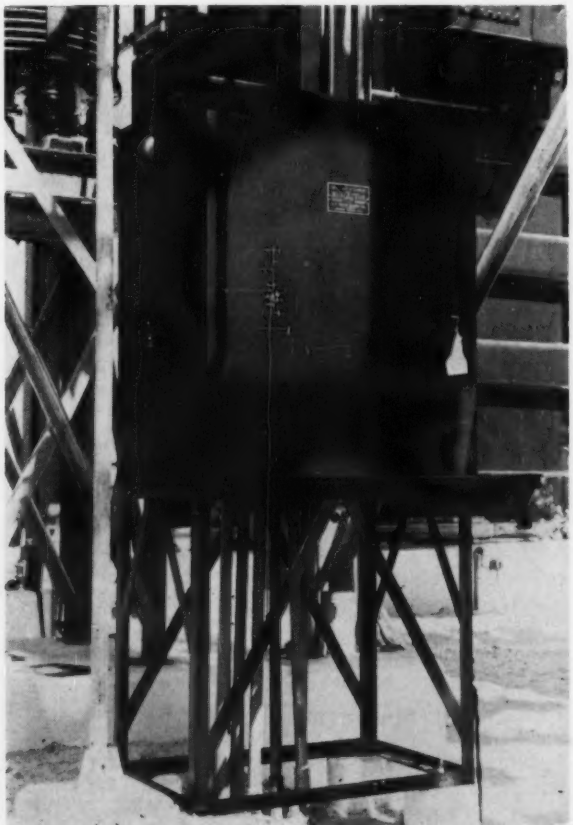
To date there are 93 protective units in service in 47 substations and installation in 32 additional substations is planned. Six in-service operations have been experienced. In one instance, when a feeder breaker bushing failed in service, the fault-bus CT initiated the operation.

The defective bushing was found on inspection. Because of the rapid de-energizing of the line, other damage was avoided.

Another operation was a transformer failure detected by the sudden-pressure relay. Damage to the transformer was minor compared to what could have resulted without this protection. The transformer was repairable. Still another case of trouble was the failure of a feeder breaker to open under fault. Backup relays initiated the ground switch scheme and the transformer was isolated from the line.



PANEL ARRANGEMENT of unit ground switch relay cabinet is standardized. Relay scheme is designed for installation at any tapped substation without field changes

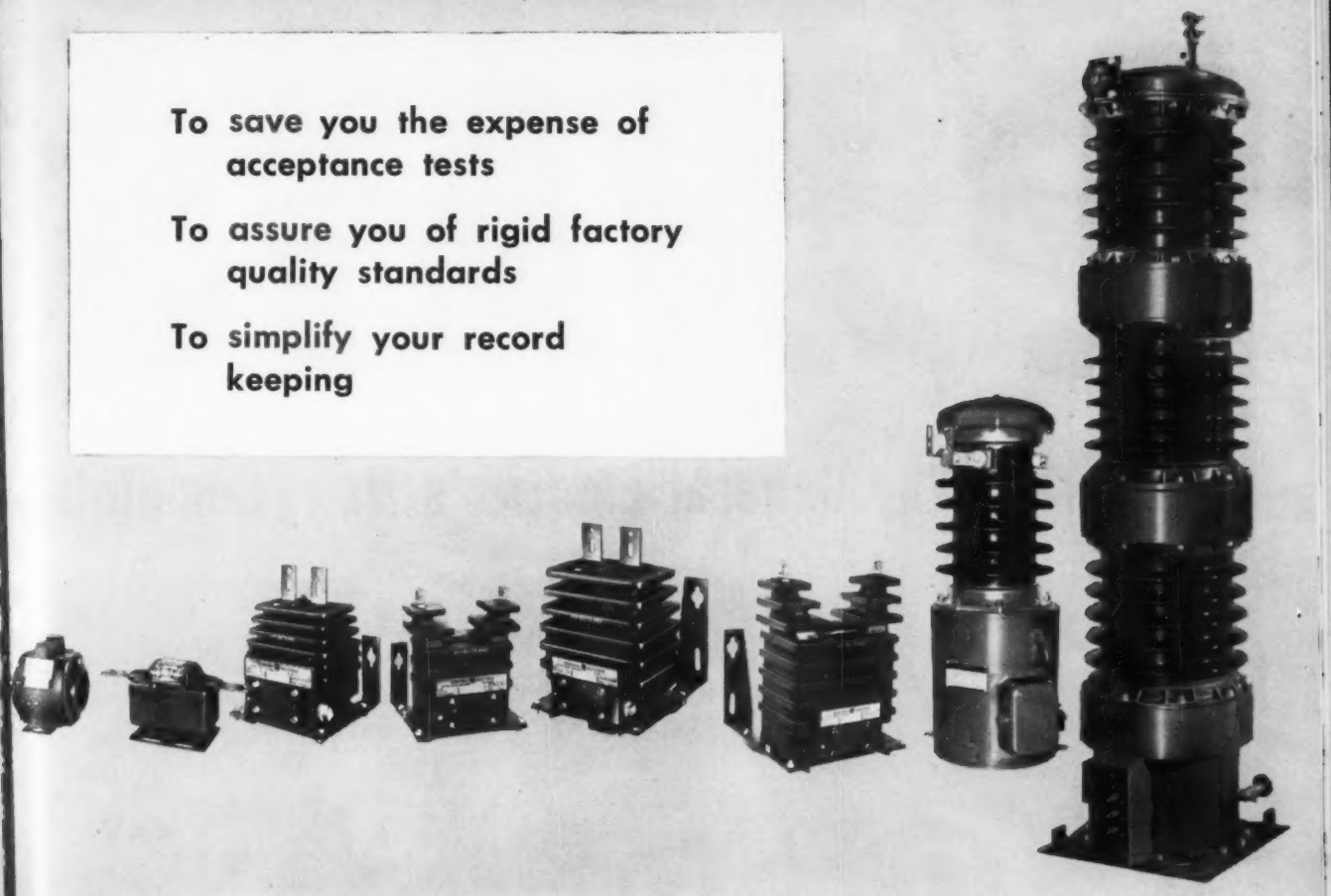


OUTDOOR CABINET was designed to contain current transformers sized for all expectable conditions, and the panel it contains meets requirements of each power transformer

To save you the expense of acceptance tests

To assure you of rigid factory quality standards

To simplify your record keeping



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Burden V.A.	Burden P.F.	Sec. Volts	Conn. X or Y	Secondary (X Wdg.) R. C. F.	Secondary (X Wdg.) P. A. E.	Tertiary (Y Wdg.) R. C. F.	Tertiary (Y Wdg.) P. A. E.
0	—	115	1 - 3	.9997	-1.1	.9997	-1.1
0	—	115	1 - 3	.9997	-1.1	.9997	-1.1
200	1.0	115	1 - 3	1.0008	-3.7	1.0009	-4.1
0	—	67.08	2 - 3	.9998	-0.8	.9998	-0.8
200	1.0	67.08	2 - 3	1.0012	-2.6	1.0013	-3.6

Date 4/30/59 Tested by J.W.F.

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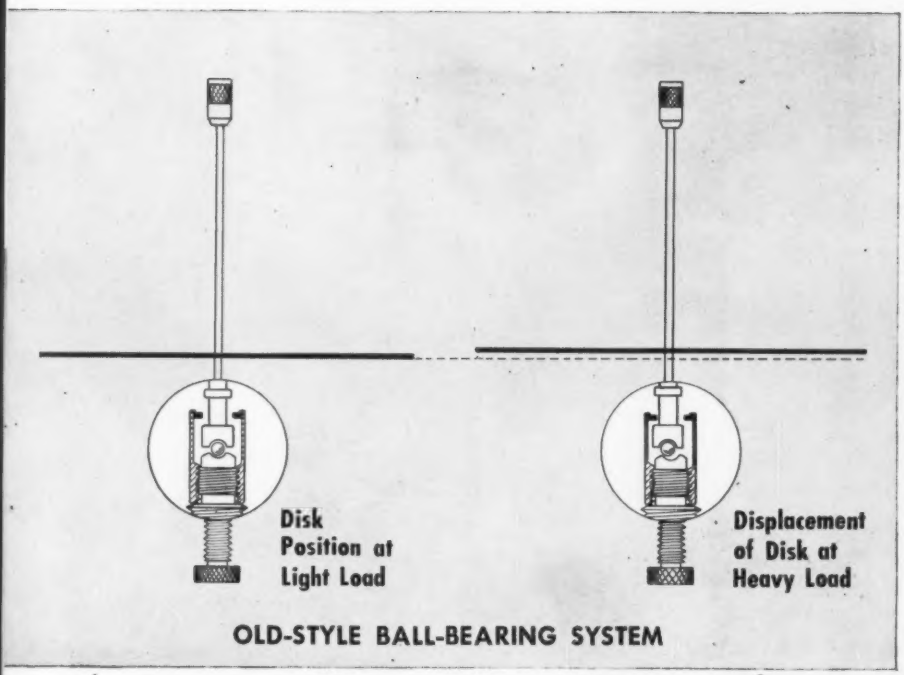
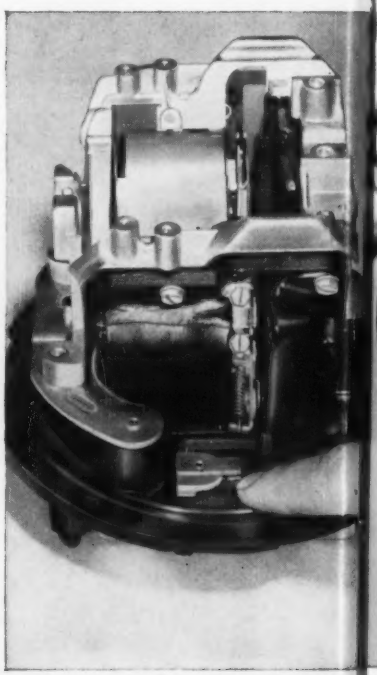
GENERAL ELECTRIC

5 WAYS

Here's Why General Electric's New, Complete



OLD-STYLE BALL-BEARING SYSTEM



1 MAGNETIC SUSPENSION ASSURES ACCURACY THROUGH FULL METER RANGE—With conventional ball and jewel bearing system, higher loads can force the disk out of position and cause inaccurate meter readings. Because the disk in General Electric polyphase meters floats free, there's never a danger of disk displacement at any load . . . meter readings are accurate through full meter range.

In addition, because there are no ball bearings in G-E's magnetic suspension system, you eliminate bearing inspection, cleaning and replacement costs. You also minimize revenue losses because this free-floating system reduces friction-caused tilt errors.

2 COORDINATED INSULATION SYSTEM PROVIDES MAXIMUM SURGE PROTECTION—Exclusive series gap design, with magnetic blowout, offers best protection against lightning and other surges. Flashover is controlled and the resulting arcs extinguished within ½-cycle by this unique gap design.

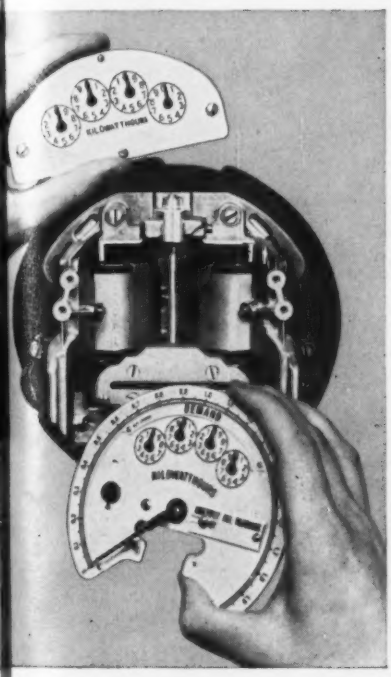
THESE FIVE EXCLUSIVE FEATURES, together with unexcelled load and power factor performance, combine to make the General Electric V-60's your best meter buy.

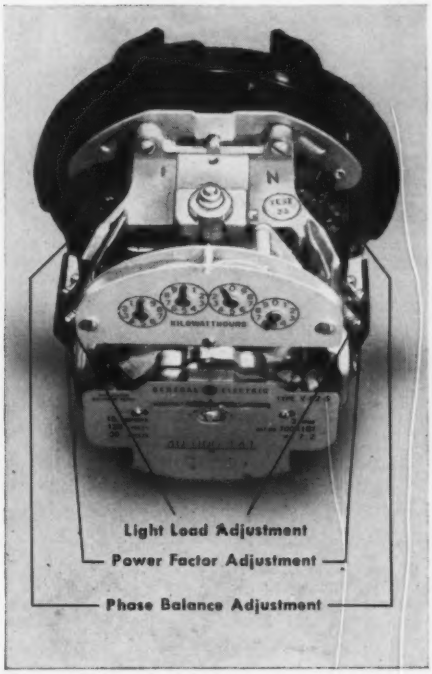
There's a G-E V-60 meter to handle every Class 10, 100 or 200 two-stator polyphase application. Depending upon your needs, specify the V-62 (network and 3-wire, 3-phase), V-63 (3-wire, 3-phase), V-65 (4-wire Y, 3-phase), or the V-66 (4-wire △, 3-phase).

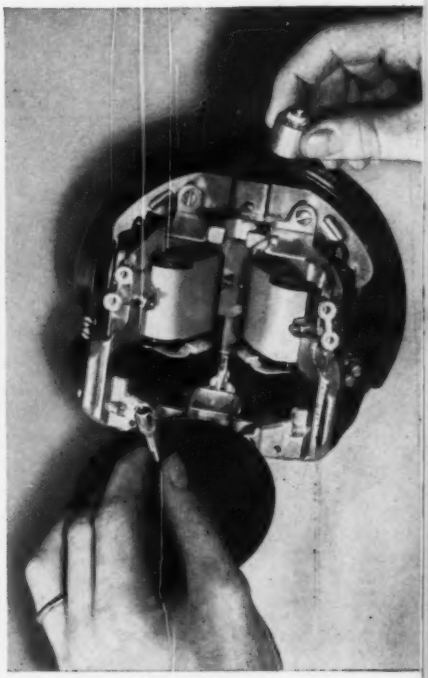
FOR COMPLETE INFORMATION on G-E's new V-60 polyphase meter line, contact your nearest G-E apparatus sales representative or write General Electric Company, Section 628-28, Schenectady 5, N. Y.

BETTER

V-60 Polyphase Meter Line Is Your Best Buy!







3 NEW POLYPHASE METER LINE GIVES YOU GREATER VERSATILITY – V-60 meters accommodate either kilowatt-hour or demand registers without use of adaptors or intermediate gearing. Any G-E demand register manufactured in the last ten years can be used on V-60's as well as on any other G-E meter.

4 ONLY V-60 METERS OFFER COMPLETE, INDIVIDUAL STATOR ADJUSTMENTS—General Electric's advanced V-60 design provides complete vernier adjustments on each stator for all polyphase load conditions. Meters you receive are precisely calibrated for optimum performance. Only one of the light load adjustments is required for normal calibration "touch-up."

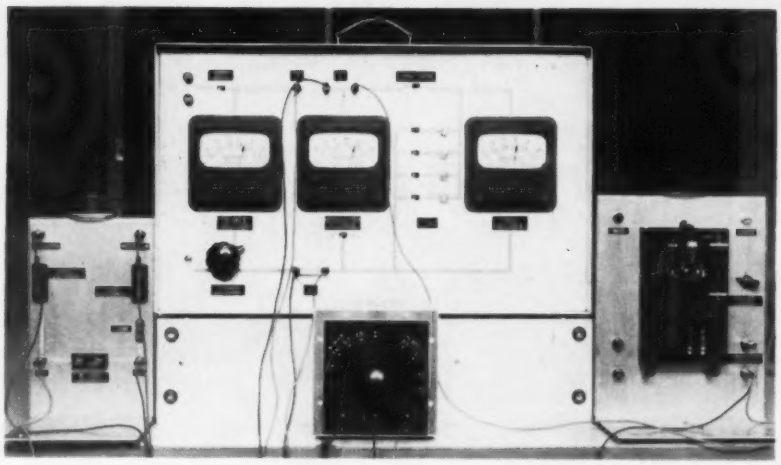
5 EXCLUSIVE "V" STATOR DESIGN SIMPLIFIES FIELD MODIFICATION—Because of G-E's unique "V" stator design, disk and shaft assembly can be removed to accommodate contact devices and detents without disassembling meter. Precisely doweled magnet location eliminates need for recalibration.

Progress Is Our Most Important Product

GENERAL ELECTRIC

Instruct Personnel With Training Aids

PAUL J. RIEMAR, Distribution Engineer, Cincinnati Gas & Electric Co, Cincinnati, Ohio.



A series of training programs for manual and technical personnel have proved valuable to Cincinnati Gas & Electric Co. Demonstration panels and other training aids have helped instructors give workers a greater understanding of basic electrical principles and devices.

Panels demonstrating principles and proper applications of capacitors, voltage regulators, and other equipment are used. Other panels illustrate principles of 3-phase power and conductor impedance.

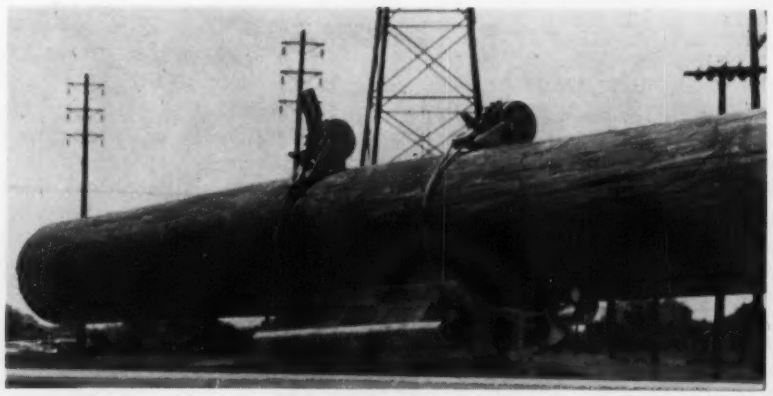
The instruction is given all distribution department employees in manual and technical classifications. This includes linemen, troublemen, inspectors, draftsmen and other technical personnel who have not had enough formal engineering training to obtain a degree.

New personnel hired into technical classifications are given training in basic electrical theory and its applications to utility operations in the fields of their work.

The program represents about 32 hr of classroom time with an additional 35 to 40 hr of equipment training for linemen. Instructors are engineers from the distribution engineering group. Results of qualifying examinations taken by personnel applying for jobs in higher classifications give evidence of the value of the training program and instructional aids.

Counterweights Aid Pole Setting

W. CHIDESTER, Line Foreman,
T. W. WIGGINS, Line Foreman, Ohio Power Co, Canton, Ohio



Use of 3-ft lengths of railroad rail as counterweights permits small crews to set long poles safely. Counterweight use allows installation of poles 5 to 10 ft longer than could otherwise be handled by the same lifting equipment.

Rail sections are attached with pole binders near the bottom of the pole. Placing the weights a short distance from the end rather than at the very bottom, permits the pole to be secured in the hole before the counterweights are removed.

Improper balance, because of limited derrick height, is overcome. When using counterweights, care should be taken not to load the lifting equipment beyond rated capacity.

YOU GET

LONG-LASTING PROTECTION FOR YOUR OVERHEAD SYSTEM

with

BLACKBURN *Grounding* DEVICES

Type GTC 1
One plate tower ground clamp

Type GTC 2
Two plate tower ground clamp

Copper Bonded Pigtail

Type GUV
U-bolt ground clamp parallel or 90°

Steel Driving Stud for Sectional Ground Rods

Copper Alloy Coupling for Sectional Ground Rods

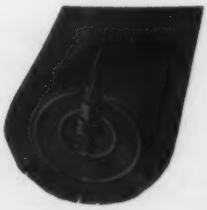
Copper Bonded Sectional Ground Rods

Copper Bonded Regular Ground Rods

Type GG
Ground Rod Clamp
Socket set screw

Type GGH
Ground Rod Clamp
Square head bolt

Type B
Budget Line Ground Rod Clamp
Square head bolt



Type GP 100
Electrolytic Copper Pole Bottom Plates
7½", 10", 14" dia.

Blackburn grounding devices will save you thousands of dollars annually in preventing burnouts of expensive overhead equipment. This complete line simplifies your stocking problem—one source for all your needs. Like all BLACKBURN products they are constructed of high-strength corrosion resistant materials—designed for easy installation and engineered for long-lasting, trouble-free grounding. Always specify BLACKBURN.

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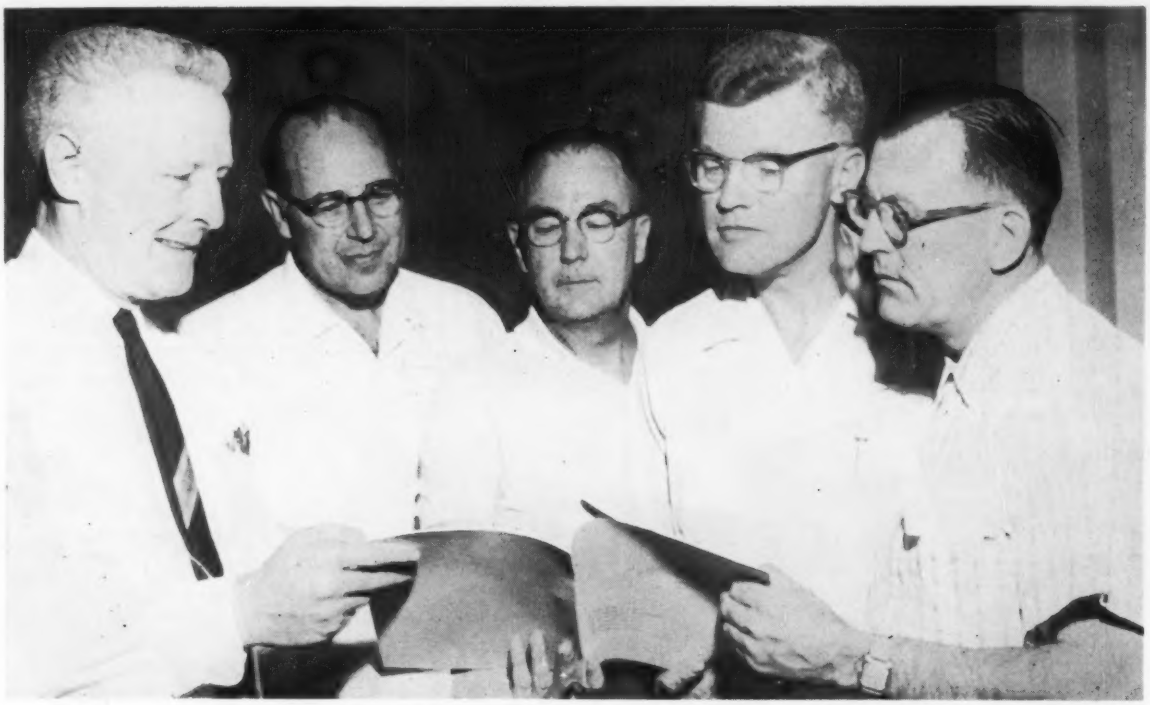


LOOKING OVER the morning agenda are: (left to right) Presiding Chairman, R. B. Gear, Commonwealth Edison; speaker, G. A. Spencer, Detroit Edison; and panel members, W. Cannicott, Indianapolis Power & Light, W. J. Pierce, Detroit Edison and H. M. Barrett, Delaware Power & Light. In all, there were 18 papers presented

How Utilities Cut Costs through 'Value Analysis'

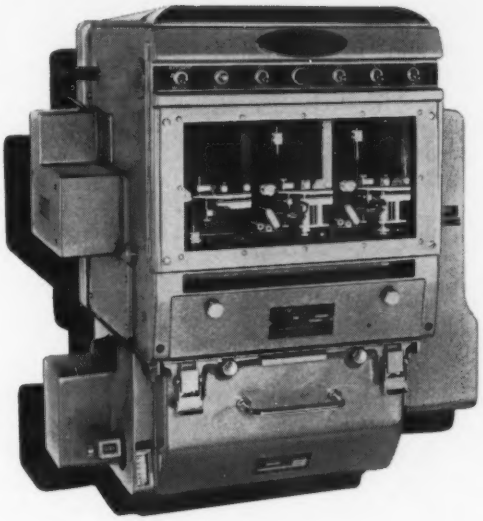
Sticking strictly to a well-planned program under the theme of "Better Materials Management Means Improved Utility Performance" more than 112 *purchasing and stores executives attended a hard-working two day session at the Edison Electric Institute's Annual Purchasing and Stores Committee Meeting held in St. Petersburg, Fla., May* 4 *and* 5. *Due to the wealth of information in the papers presented EW will publish the report of this meeting in three successive issues. This is the first report.*

"The phrase is new, but the concept is as old as the purchasing profession." Thus W. J. Pierce of Detroit Edison Co, chairman of the Edison Electric Institute Purchasing & Stores Committee, introduced a panel discussion of "value analysis"—one of the most important cost-cutting techniques in the utility industry today. "We have only recently glamorized, by this catchy title, a practice and philosophy familiar to all of us."

Use of value analysis has brought professional status to Purchasing, Pierce stressed, and has enabled the PA to "make very real contributions to cost reduction and improvement of a company's profit position." Pierce went on to describe value analysis as it is now practiced by utilities. Panelists representing the purchasing departments of utilities from coast to coast followed up with tips on how to make a value analysis program work.

"Value analysis is the analytical procedure for determining the best item, material, or service to provide the function desired," Pierce said. The first step

HAMILTON RS-9 FOURTEEN AUTOMATIC OSCILLOGRAPH



NOW PRICED WITHIN YOUR BUDGET

Monitor your protective system with an RS-9 FOURTEEN

Now, with research and development costs amortized, the price of the Hamilton RS-9 Fourteen Automatic Oscillograph has been reduced, placing it within easy reach of every power company.*

The Hamilton RS-9 Fourteen Automatic Oscillograph constantly stands watch over your protective equipment. It gives you a permanent, comprehensive record of the operation of your system under fault conditions—providing you with the PROOF you need of the sequence of relay and breaker operation. It shows when a relay or breaker is slow acting or erratic before it can cause system damage and costly down-time.

The RS-9 Fourteen is designed specifically for use in power plants and sub-stations.

Write today! Tell us what your requirements are...we will be glad to show you how the RS-9 Fourteen can meet them at low cost.

*TYPICAL SYSTEM INSTALLATION

Type RS-9 Fourteen Automatic Oscillograph—complete with initiating mechanism, time recorder and record magazine. (For operation on 125 volts)	$3,330.00
14 Bifilar galvanometers—group 155	1,330.00
1 lamp power unit	270.00
7 RAV (voltage) or 7 RAC (current) shunt resister assemblies	490.00
1 3-phase under voltage starting relay	143.00
1 neutral current starting relay	160.00
1 overcurrent starting relay	160.00
1 auxillary network	107.00
	$5,990.00

PRICES NET F.O.B. DENVER, COLORADO

HAMILTON WATCH COMPANY
HATHAWAY INSTRUMENT DIVISION
5800 East Jewel • Denver, Colorado

is finding out what that function is. "The buyer cannot hope to recommend a better product, an alternate product, or even do a good job of buying the product specified if he doesn't know the end use to which it is to be put. This means he cannot be glued to a desk. He must get into the shop—learn the problems first hand—be able to talk to the requisitioners intimately on a man-to-man basis if he is to make his greatest contribution."

Value analysis need not always wait for a requisition, Pierce said. It works best when buyer and engineers have time to prove out new materials and include them in the specification. "Pre-planning is just as important to the best utilization of value analysis as it is to any other management function."

The purchaser has no exclusive franchise on value analysis techniques. In fact, Pierce said, "Part of the buyer's job is to sell the concept to others and get all persons thinking in terms of determining the best item for the function to be performed."

Here Are Some Tips on How to Make Value Analysis Work

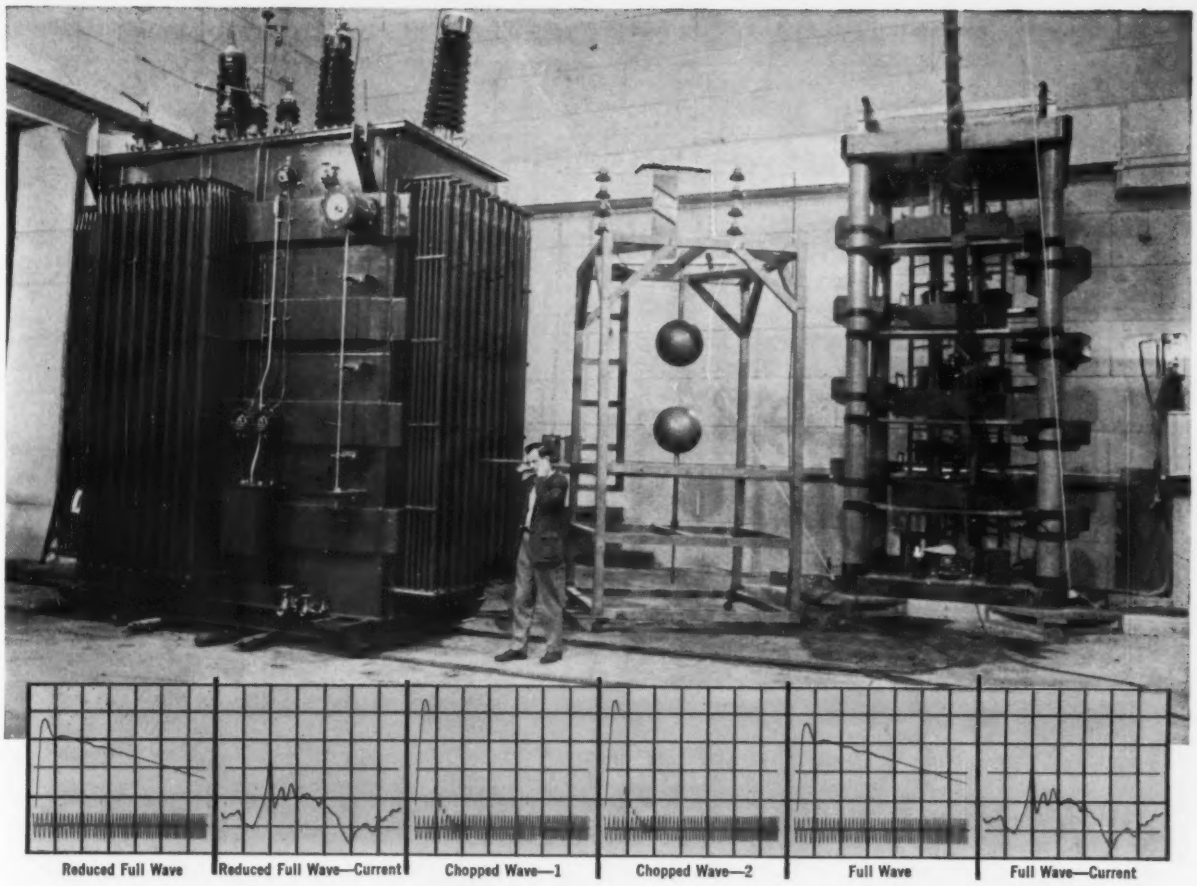
• **To get a value analysis program started,** H. Wilson of Carolina Power & Light Co suggests group listing of all items purchased, and a constant review of applicable specifications to make sure they recognize today's needs and the latest processes and materials. "Service records, proper tests, and *all* the facts and opinions of the using departments are also important."

• **To hold down costs of the program itself,** William Cannicott of Indianapolis Power & Light Co recommends the committee system—"to keep our manpower requirements down to a minimum." He explained: "When we in purchasing come up with a saving on an item of purchase, we can pick up a telephone and call Material Control, Stores, Operations, or Engineering and resolve our problems in a very short time, thus cutting down on a lot of red tape."

"Should we not receive the necessary teamwork or support from any of the other departments mentioned, we have the alternative" of submitting a written report on the suggested cost saving to the System Economy and Improvements Committee, which is headed by the president of the company. This committee meets once a month and prepares a sixty-day economy report to management, said Cannicott, adding that in 1958 the committee reported savings of more than $160,000.

• **To break ground for a future formal value analysis program,** H. M. Barrett of Delaware Power & Light Co says his company plans to use the Standards Committee. Committee members from the purchasing department "will attempt to interject, in varying degrees, the value analysis approach on items under discussion without calling it such. We hope this approach, rather than waving the flag about a new method, will tend to crack the age-old barriers of complacency . . . We feel that if we can get other concerned personnel to think along these lines before a formal program starts, it will help considerably."

• **To get maximum value, use the engineering—operating—purchasing team,** urged F. E. Baxter of Pacific Gas & Electric Co in a previously prepared paper which was read in his absence. "Operating and Engineering personnel generally do not maintain material cost and consumption data to the extent that purchasing must . . . We believe there is a need for more intensive value analysis on many commodities than is being applied by the combination of operating and engineering talent. We believe that Purchasing can be most effective in evaluating material and process developments and their cost characteristics . . . The available cost and usage records could establish Purchasing as a third partner dedicated to obtaining maximum value for material dollars spent."



RESEARCH and TEST...

Your Guarantee of Modern Design, Top Quality in Central Power Transformers!

As part of a stepped-up research and development program, Central announces the addition of a new Research and Test Laboratory.

The insulated laboratory building, isolated from the main plant, houses much new equipment which is being used primarily for research in the reduction of transformer noise levels.

The new Laboratory also houses Central's modern 1,600,000-volt impulse generator to facilitate testing under controlled atmospheric conditions.

Central's expanded research program covers all areas leading to new and improved techniques related to every phase of transformer manufacture.

Just one more reason why Central Transformers are **PREFERRED** *throughout the Nation*

CENTRAL CTC

Sales Offices in Principal Cities

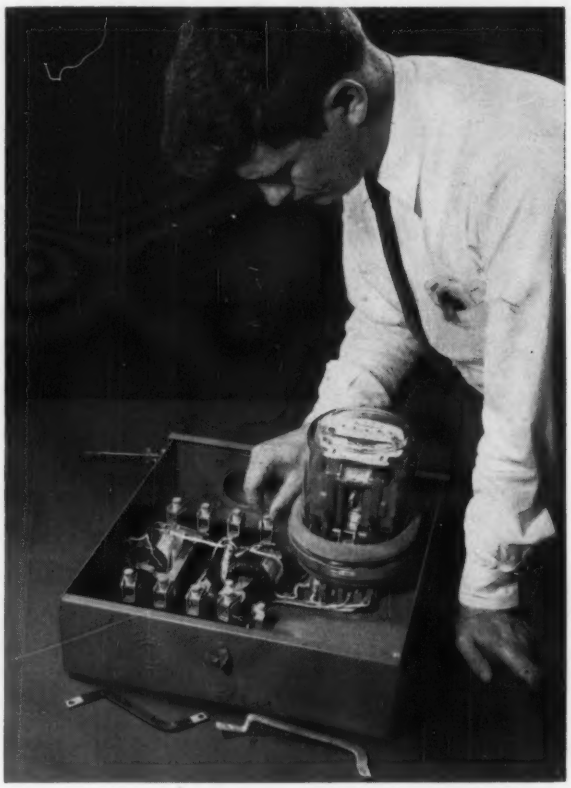
Transformer Corporation

Telephone JEfferson 4-5332

PINE BLUFF, ARKANSAS

NEMA

Westinghouse Designs All-Purpose Meter Unit



A single all-purpose meter package for metering the basic types of single and polyphase distribution circuits has been developed by Westinghouse Electric Corp.

The meter package is an integration of a 200-amp transformer-type mounting, a DSP-2 watthour meter, and a family of interchangeable bus bars, all within a single steel enclosure.

Adapting the meter package to a new use can be done simply in the field since conversion requires only a rearrangement of the bus bars. Only tool required is a wrench for tightening terminals.

The standard assembly at time of manufacture is for 240-v, 3-phase, 4-wire delta service. Other bus bar connections adapt the package for these applications: (1) 1-phase, 3-wire, 240-v; (2) 3-phase, 3-wire, 120 or 240-v; (3) 3-phase, 4-wire wye, 120/208 or 277/480-v; (4) 3-phase, 4-wire delta, 240-v; and (5) 120 or 240-v network circuits. Performance in these applications is reported to be equivalent to that of self-contained meters.

Westinghouse has started production of the new equipment at its meter department in Raleigh, N. C.

A-C Instructs Motor Shop Personnel in New Insulation

This traveling workshop is Allis-Chalmers' new means of instructing the company's licensed motor shop personnel in proper techniques of winding and producing Silco-Flex insulated coils. The all-silicone-rubber coil-insulating process has just been made available to A-C motor shops in most major industrial areas. Any motor with form-wound coil construction can be processed, receiving the A-C shop warranty.

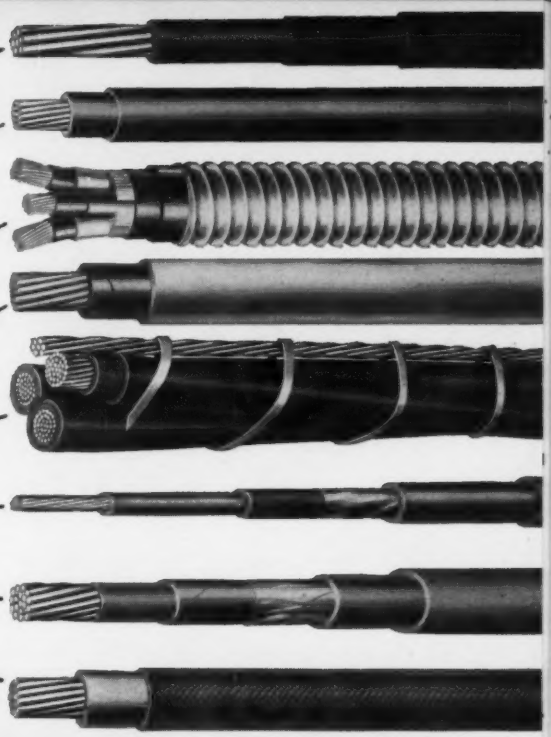
The 2½-ton trailer workshop is equipped with an oven for controlled processing, high potential testing apparatus, a partial stator core for winding demonstrations, and electrical brazing equipment. For extra floor space, both sides of the body of the trailer can be opened.

Coils produced in service shop fabrication have the characteristics of Silco-Flex insulated coils built at the factory for original equipment: complete sealing throughout the entire winding system. Allis-Chalmers says resistance to abrasion, heat aging and contaminants enables open motors with Silco-Flex coils to be used in almost any industrial area, even where totally enclosed motors have been required.

(*More Manufacturers News, p* 91)

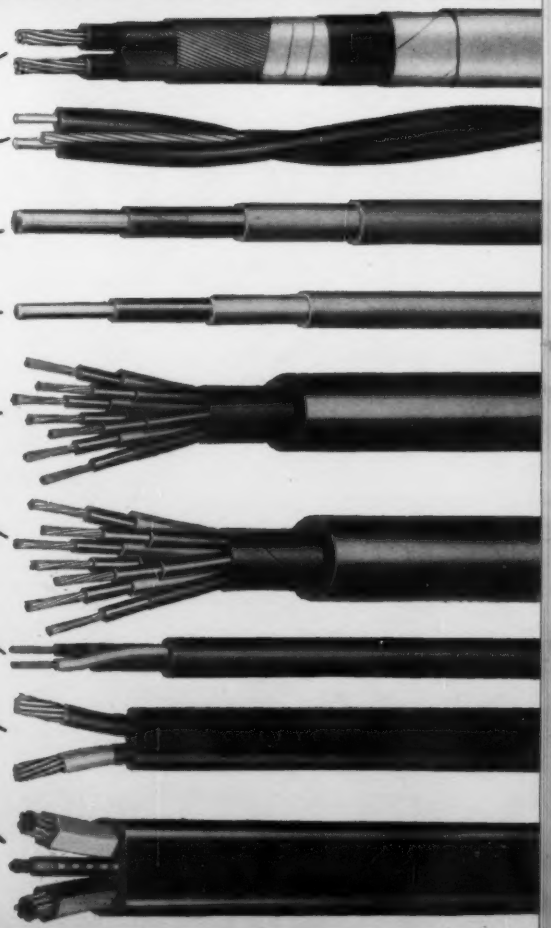
DISTRIBUTION • BRANCH CIRCUITS • FEEDERS

WHEN OPERATIONS REQUIRE	SELECT
75°C Wet or Dry Building Wire	Collyer RHW
75°C Wet or Dry RR Power Cable	Collyer Style RR (RHW Insulation)
85°C Wet or Dry-RR Ozone Resisting Power Cable	Collyer Style RR (Butyl Insulation)
75°C Power Cable, Dry Locations	Collyer VCB with or without interlocking armor
75°C Power Cable, Wet or Dry Locations	Collyer VCL with or without protective neoprene sheath
85°C Overhead Ozone Resisting Power Cable	Collyer Self-Supporting Aerial Cable (Butyl Insulation)
110°C Power Cable, Dry Locations	Collyer Type AVA
110°C Power Cable	Collyer Type AVL
150°C Power Cable	Collyer Silicone Power Cable



WHEN THE CALL IS FOR CABLE . . . CALL FOR Collyer

SERVICE CABLE	
75°C Wet or Dry Service Cable	Collyer SE Style U or A
75°C Wet or Dry Overhead Service Cable	Collyer Neutral Supported Service Cable
SWITCHBOARD WIRE	
90°C Switchboard Wire	Collyer Type AVB
90°C Switchboard Wire	Collyer Type TA
CONTROL CABLE	
75°C Wet or Dry Small Diameter Control Cable	Collyer C-141 (Polyethylene, Nylon, PVC)
75°C Wet or Dry RR Ozone Resisting Control Cable	Collyer RR Control Cable (Oil Base Insulation)
PORTABLE CABLES	
Portable Power Cords	Collyer SJ or SJO, Light Duty Collyer S or SO, Heavy Duty
Heavy Duty, Without Ground	Collyer Type W
Heavy Duty, With Ground	Collyer Type G



for complete details, write

Collyer Insulated Wire Company
247 Roosevelt Avenue
Pawtucket, Rhode Island

TUBE 50 KVAR POWER CAPACITOR

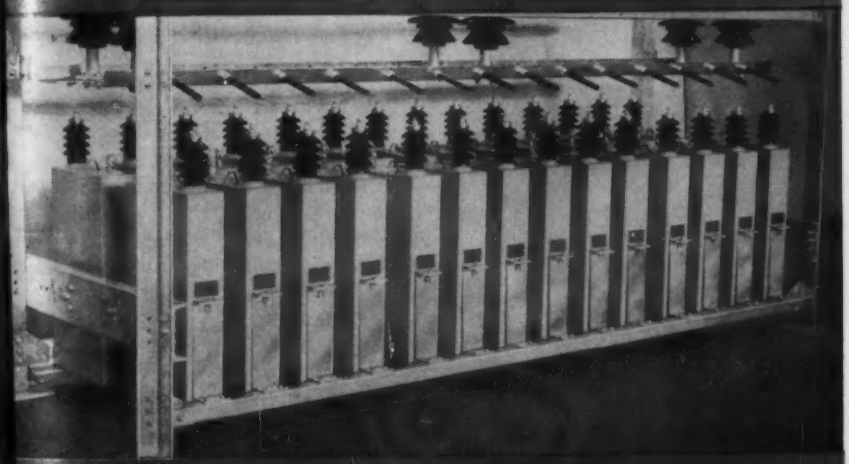
creative engineering

Photograph on opposite page illustrates method of mounting, connecting and fusing of two 16-unit series groups in a single frame of Tube "Varilock" assembly forming one tier of 16800 KVAR, 3 phase, 69 KV outdoor, open stack type shunt capacitor equipment. Phase capacity is made up with 7 groups of 50 KVAR, 7960 volt TEMPALL capacitors in series and 16 units in parallel per group.

DESIGNING A VERY HIGH VOLTAGE transmission system is difficult enough when the installation site presents no unusual physical problems. But when the capacitors at that installation must cope with temperature extremes, contamination and shock caused by occasional earthquakes, the task calls for expert assistance ... the kind of assistance Tobe supplied to engineers at this 230,000-volt installation in the West.

Tobe's solutions were just what the engineers ordered ... reliable, long-lasting capacitors, extra-strength porcelain insulators and additional mounting supports. But then, Tobe could be depended on to come up with the "creative engineering" the job demanded—they've been solving similar capacitor research and manufacturing problems for over 30 years. Whether your needs involve high-voltage power transmission or energy storage for thermonuclear reactors for utility use, call in Tobe to look at your specs. TOBE DEUTSCHMANN CORPORATION, Norwood, Massachusetts.

in action



TOBE TEMPALL CAPACITORS

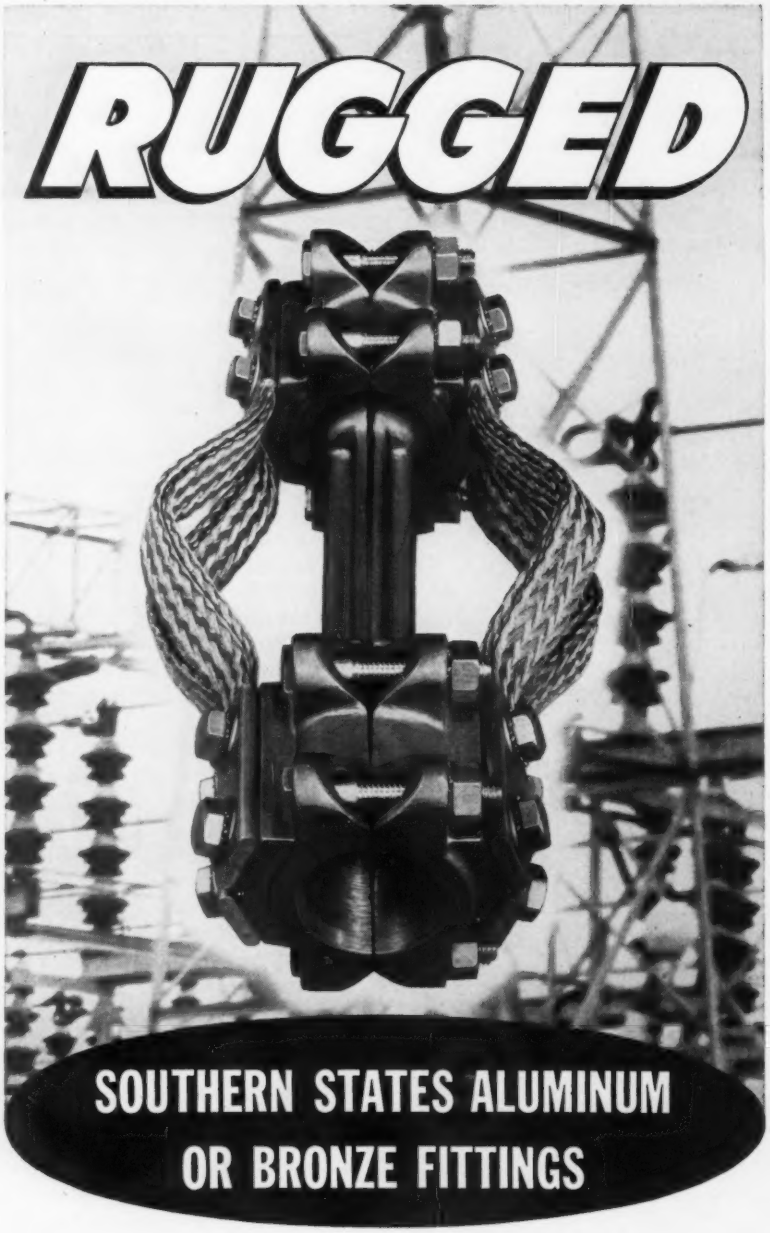
1929, persistent research, trustworthy engineering, rapid production, standards.

MANUFACTURERS BRIEFS

Ontario Hydro-Electric Commission has purchased an Alouette II jet-powered helicopter from **Republic Aviation** to spray power line right of way. The Canadian utility anticipates a minimum $17,000-per-annum savings in spraying costs because the Alouette's payload is 2½ times that of models used previously . . . Boston Edison has installed a Univac solid-state document printer, made by **Remington Rand,** for consumer billing and for establishing a master card file. Data will be set up on meters, meter reading, deposits, addresses and accounts receivable . . . Eastern Maine Electric Co-op will use a 300-kw diesel-electric power plant, constructed by **A. G. Schoonmaker Co,** as an emergency trailer-mounted power source, pending extension of power lines. It is equipped with a 375-kva electric generator and a 450-hp diesel engine . . . Southern Electric Generating Co recently placed an order with **I-T-E Circuit Breaker Co's** Greensburg Div (formerly R&IE) for 12 230-kv outdoor disconnect switches for SEGCO Steam Plant No. 1. The switches will have an unusually high 70,000-amp momentary current capacity, and will be rated at 1600-amp continuous current, 900 kv BIL. The June shipment will also include eight 230-kv switches rated at 1200-amp continuous current and 61,000-amp momentary current . . . Niagara Mohawk Power is installing a second pair of combustible gas alarms at Huntley Station on the Niagara River. Explosive concentrations of hydrogen on two new hydrogen-cooled, 200-Mw generators will be avoided by constant sampling of the atmosphere at eight points on each generator. Made by **Mine Safety Appliances,** the analyzers give accurate indication of the degree of hydrogen concentration, give visual signals, energize alarms, close and open valves and/or activate ventilation fans.

H. K. Porter's **Delta-Star Electric Div** now offers palletized shipping of distribution transformers, upon request. The crateless shipping method provides customers with

(*Continued on page* 92)



Extra ruggedness at critical stress points receives special attention in the design of Southern States connectors. Ears and walls are husky enough to take the full squeeze of clamping bolts without visible distortion. This extra ruggedness, without excessive bulkiness or weight, is made possible by careful engineering design — backed by more than 25 years experience in producing connectors. *Never underestimate the importance of a good connection!*

SOUTHERN STATES
EQUIPMENT CORP.
HAMPTON, GEORGIA

IN CANADA: Dominion Cutout Co., Ltd., Toronto

Manufacturers Briefs

(*Continued from p* 91)

greater handling and storage conveniences, reduced shipping costs . . . **Electronic Communications** is adding a 30-day rental plan for its "electronic messenger" to its lease and purchase plans. The transmission device conveys facsimiles of any written or printed material and photographs over leased telephone circuits, coaxial cables, microwave or radio channels . . . **Eisler Transformer Co** has installed an impulse testing unit at its Dover, N. J., plant to test its own transformers and other electrical apparatus. It consists of an impulse generator which produces standard NEMA test waves with peak potential up to 400 kv, circuits for impulse forming, and potential dividers for recording with cathode ray oscillograph . . . The generator rotor and other component parts for Yankee Atomic Electric's 134-Mw nuclear power plant were recently completed at **Westinghouse's** East Pittsburgh Works. The unit is scheduled for installation later this year, and initial operation is planned for 1960 . . . **Babcock & Wilcox** is installing this month a 105-ton steel vessel, the atomic furnace for the N. S. Savannah, first nuclear-powered merchant ship. The reactor vessel stands 28 ft high, is 9 ft in diameter. Its inner surface is cladded, or bonded, with a thin layer of stainless steel by a special B&W patented process . . . Nearly 23 miles of aluminum 3-kv direct burial cable, and over 400 aluminum standards and 550 luminaires were installed by **Kaiser Aluminum & Chemical Sales** for Miami International Airport's new lighting system. The cable, 19-strand, single-conductor, #2, is non-shielded, butyl-insulated and neoprene-jacketed. **Thomas & Betts** supplied over 800 aluminum-to-copper connections and splices for the airport installation.

General Cable has purchased Indiana Steel & Wire and will operate it as a wholly-owned subsidiary. Indiana Steel produces steel wire chiefly used in power transmission and communication . . . **General Electric's** communication products dept has moved its five-state southeastern regional 2-way radio sales office from Atlanta to Tallahassee.

ALLEN-BRADLEY
Solenoid Starters give

MORE MILLIONS OF TROUBLE FREE OPERATIONS

. . . and for good reasons

• ONE MOVING PART

With this simple solenoid design, there's virtually nothing to go wrong—all trouble-causing bearings, pivots, and flexible jumpers have been eliminated.

• DOUBLE BREAK, SILVER ALLOY CONTACTS

Allen-Bradley silver alloy contacts never require maintenance. They are always in perfect operating condition . . . and remain so until completely worn away.

• SIMPLE UP-AND-DOWN MOTION

The virtually frictionless, straight line vertical motion provides uniform contact pressure at all times—and assures consistent, rapid operation of the contactor.

• RELIABLE OVERLOAD PROTECTION

All A-B starters are equipped with two permanently accurate and reliable overload relays that protect motors against "burnouts." Three overload relays can be furnished.

A-B
ALLEN-BRADLEY SOLENOID CONTACTORS HAVE SILVER ALLOY CONTACTS
NEVER CLEAN, DRESS, OR FILE THEM
EVEN THOUGH CONTACTS APPEAR PITTED AND BURNED OR ARE ENTIRELY BLACK, THEY WILL GIVE SATISFACTORY OPERATION
CONTACTS NEED REPLACEMENT ONLY WHEN THE SILVER ALLOY HAS BEEN WORN AWAY
ALLEN-BRADLEY CO.

BULLETIN 709 STARTERS are made in 9 sizes from Size 0 (at left) up to Size 8.

BULLETIN 709 SIZE 7 with maximum ratings of 300 hp, 220 v; 600 hp, 440-550 v.

ALLEN-BRADLEY

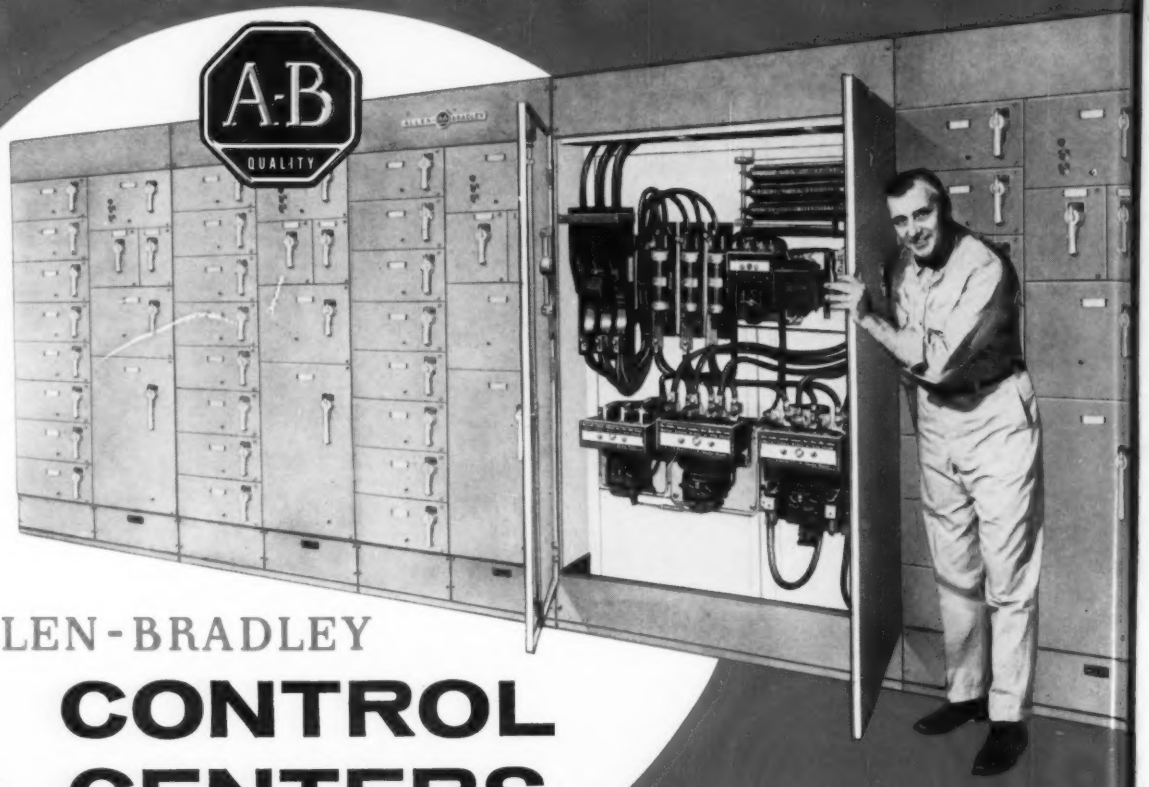
MEMBER OF NEMA

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

QUALITY MOTOR CONTROL

4-59-MB

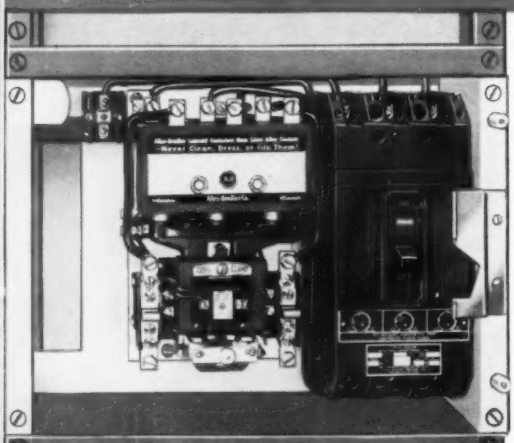
Advanced Design Features in a Control Center . . .



ALLEN-BRADLEY

CONTROL CENTERS

. . . offer tops in
FLEXIBILITY • SAFETY
QUALITY APPEARANCE



This typical unit of an A-B control center shows a Bulletin 709, Size 2 starter and an I.T.E. circuit breaker.

Allen-Bradley control centers are the "label" of a modern plant. They make neat, centralized installations and—where this is practical—do away with individual starter mountings and complicated wiring. The control center may even reduce installation cost—as compared with using individual starters. Here are some of the up-to-date design features which make the A-B control centers so popular.

NEW SPACE SAVING DESIGN—New Bulletin 798 control centers save floor space . . . provide up to 8 units in a 90" high control center unit.

PREMIUM QUALITY FINISH—An exclusive A-B finishing process assures that your control center will retain its attractive appearance over the years. Each piece is *individually* cleaned and phosphated *before* assembly—there are no "bare spots" where corrosion can have a start. Then a rust-resisting primer and a dense finish coat are baked on, providing a fine, tough, and lasting surface.

FLEXIBILITY—A-B control centers are readily adaptable to changes in operating needs—integral plug-in units can be added or modified without internal rewiring. Entire sections are easily added as needed.

SUPERIOR PERFORMANCE—Using the popular A-B solenoid starter—with only ONE moving part—assures millions of trouble free operations. Their double break, silver alloy contacts *never* need servicing.

For "tops" in control centers, you owe it to yourself to investigate Allen-Bradley's Bulletin 798. Write for complete information.

ALLEN-BRADLEY

MEMBER OF NEMA

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

6-59-MR

QUALITY MOTOR CONTROL

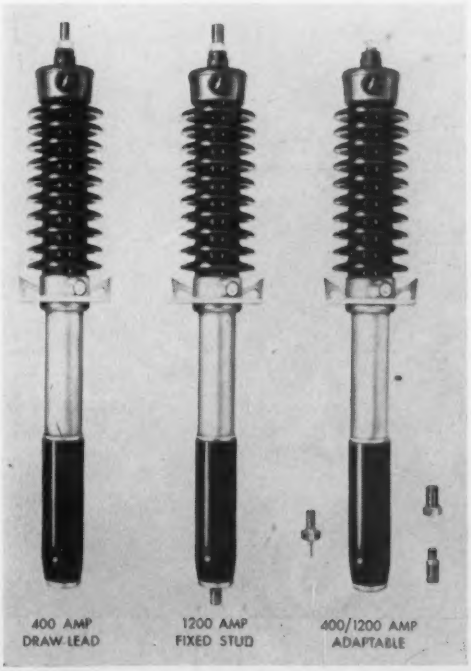
(For further information refer to Reader Service on page 100)

Capacitor . . .

. . . equipments that use 50-kvar capacitor units are now available. Designated "Mod-ul-var 50", the equipments use 50-kvar units assembled into 1,200-kvar modules. They are offered in 2,400 to 13,800-v (wye connected) and in bank sizes from 1,200 to 6,000 kvar. Field installation involves only bolting the required number of modules together.
Westinghouse Electric Corp, Box 2099, Pittsburgh 30, Pa.

Adaptable Bushings . . .

. . . are offered in a complete line from 15 through 196 kv. This POC-A line provides ful interchangeability between transformer and breaker types. Basic bushing for every voltage class can be adapted, by adding terminal fittings, to 400-amp draw lead type for transformer use or to 1,200-amp fixed stud for either transformer or breaker use.
Lapp Insulator Co, Inc, Le Roy, N. Y.

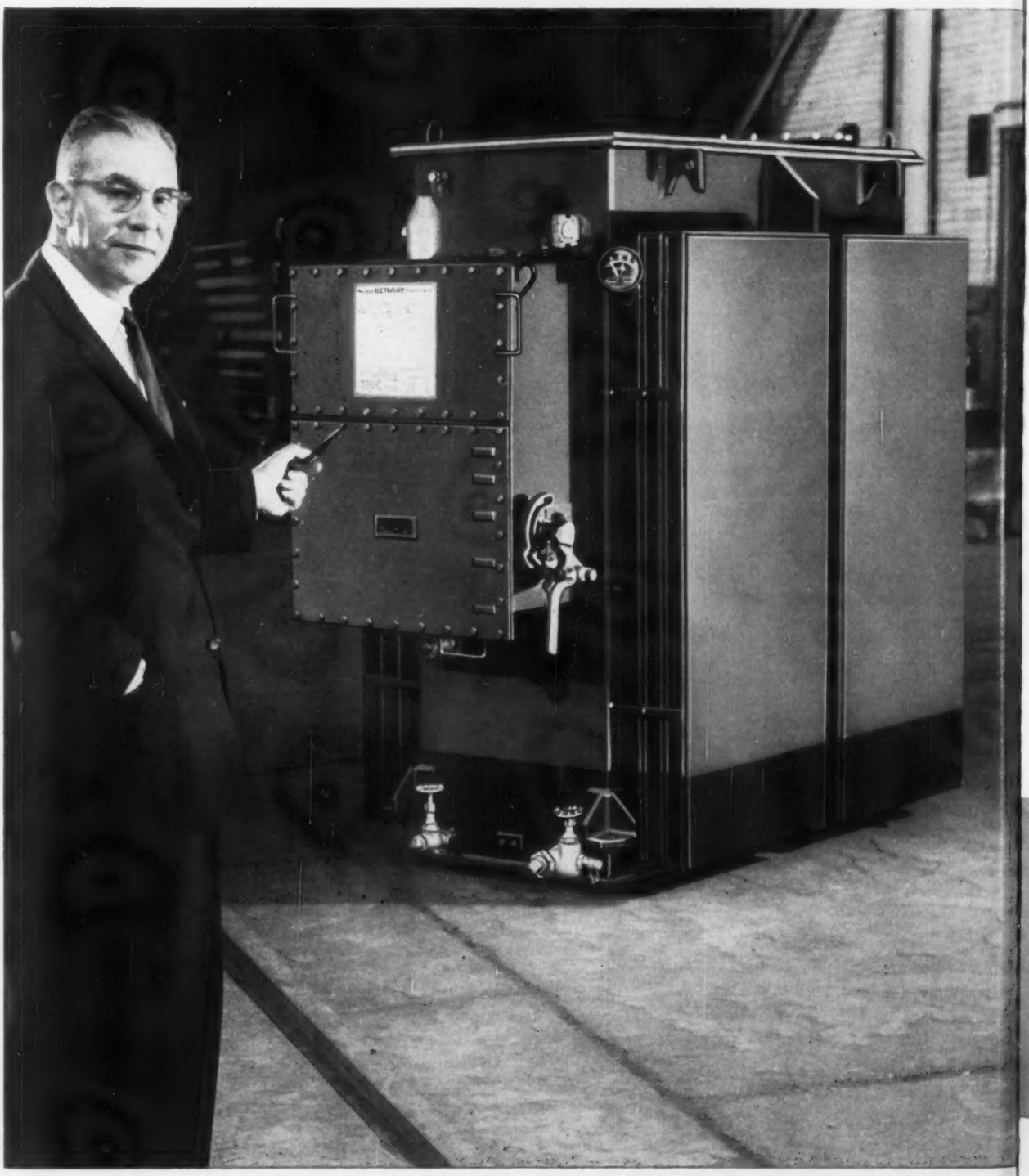


Aerial Platform . . .

. . . is designed for globe cleaning and street lamp replacement. The Strato-Tower Model SL is a complete unit, including truck chassis, aerial platform, and special utility body. Design permits maximum efficiency for one-man driver-operator use. A two-man operation unit is also available.
Strato-Tower Div, Young Spring & Wire Corp, Box 103, Elkhart, Ind.

(*More New Equipment on page* 98)

Built for close quarters...



Wagner Network Transformers

are small in size...have compact switch...feature panel radiators for smoother contour

Wagner network transformers are designed to give you smaller, lighter units, with smoother contours for easier maintenance. You can cut network system costs by using smaller vaults with these space-saving transformers—or you can put larger ratings in your present vaults. You save on maintenance, too. The panel type radiators are easy to clean, and an anti-corrosive tank finish protects exterior surfaces for years, under the adverse conditions of underground installation.

NEW WAGNER-DEVELOPED ROTARY SWITCH ... The rotary type, liquid filled high voltage switch was designed especially to meet the requirements of network systems—it is smaller in depth than previously used knife-blade type switches.

LOWER NOISE LEVEL ... Improvements in core design and materials, and newly developed methods of treating the core steel have made lower noise levels a feature of all Wagner transformers.

Constant research and development have kept Wagner up front in transformer design for more than 65 years—made the name Wagner one of the foremost in power planning.

For expert advice in solving your network transformer problems, consult your nearby Wagner Sales Engineer. There are Wagner Branches in 32 principal cities.

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Wagner Electric Corporation

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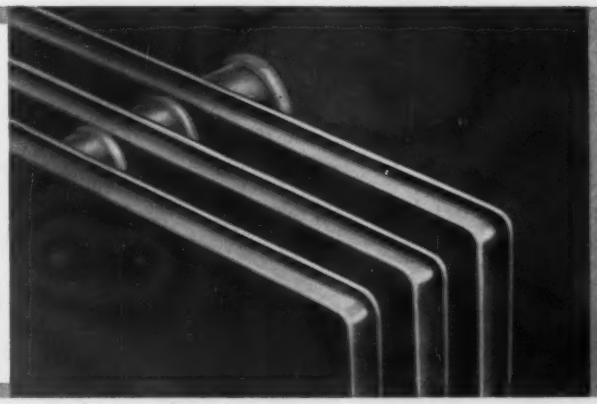
WT59-7

NEW PANEL-TYPE RADIATORS

New design radiators have smooth vertical surfaces with far fewer places where corrosive moisture and dirt can accumulate. They're easy to keep clean. Reliability is improved because there are fewer places for leaks to develop.



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Galvanized Steel Strand

for Guy, Messenger & Ground Wires

The CF&I Image—giant symbol of dependable steel products—contributes to the ever-expanding industrial growth of America. And where telephone or utility lines spring up, you'll find the CF&I Image—for in the electrical and communications industries he stands for top-quality guy, messenger and ground wires.

To prevent pole leaning and power line sagging, use CF&I Galvanized Steel Strand. Made to customer specifications or to ASTM specifications A-122 or A-363, the steel strand is quality-controlled throughout every stage of production. That's why utilities rely on CF&I Galvanized Steel Strand to stand up under the most rugged conditions.

When you need strand, see your nearby CF&I representative or local distributor for complete details on CF&I Galvanized Steel Strand.

CF&I STEEL

GALVANIZED STEEL STRAND

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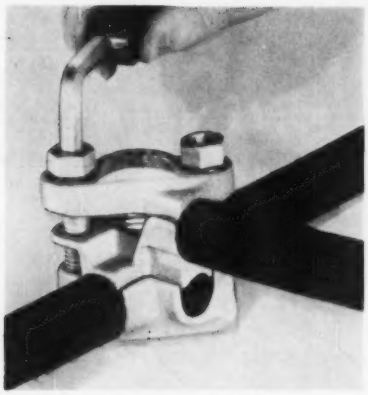


Mechanical Tap . . .

. . . for both aluminum and copper conductors is used to make tee or parallel taps or crossovers. The REDDY Tap has captive bolts to prevent loss or misplacement during installation. A free plastic-handled wrench included with the tap is the only tool needed; tap may also be installed with standard electrician's tools. It is available in six sizes to accommodate conductor sizes in any combination of main or branch from No. 8 to 500 MCM. **The Thomas & Betts Co, 36 Butler St, Elizabeth, N. J.**

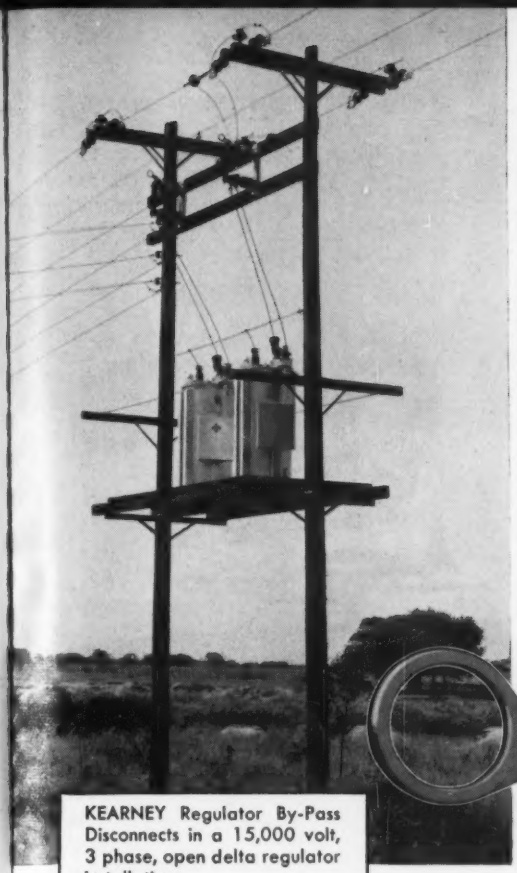
Stationary Batteries . . .

. . . are now housed in clear plastic containers instead of the molded hard rubber formerly used. The change involves PlastiCell Type CT and PlastiCal Type RCT (now called F and CF respectively) communication batteries with capacities from 720 to 1,680 amp-hr. It also affects PlastiCell Type RF and PlastiCal Type RCF control batteries (now called PF and PCF respectively) of from 880-1,650 amp-hr capacity.
C & D Batteries, Inc, Washington & Cherry Sts, Conshohocken, Pa.

Multiple Relay . . .

. . . for pilot wire control, cascading street lighting circuits and industrial applications is exceptionally inexpensive. The Type 250A Multiple Relay is complete with light-

(*Continued on page* 100)



KEARNEY Regulator By-Pass Disconnects in a 15,000 volt, 3 phase, open delta regulator installation.

Safe performance

of 4 operations in proper sequence assured by KEARNEY *REGULATOR BY-PASS* DISCONNECT

- **no danger of accidentally dropping load**
- **no hazard from interrupting exciting current**

With the same motion—in the same time—required to open *one* conventional disconnect, the KEARNEY Regulator By-Pass Disconnect:

shunts the line leads to by-pass the regulator—opens both leads to the series winding—safely interrupts the exciting current.

What's more, you realize substantial savings in cost of switches, installation time, supporting structure and leads, because *only one* KEARNEY By-Pass Disconnect is needed for each phase of a regulator installation, compared to *three* single-throw disconnects. And the operator has *maximum safety*, since all switches can be located on the same side . . . visible from one point!

JAMES R. KEARNEY CORPORATION, *General Offices:* 4224-42 Clayton Avenue, St. Louis 10, Missouri

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SAFER MAINTENANCE
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Readers Service

For additional information on new products, supplies, and services in this issue, the Manufacturers Editor of Electrical World offers his facilities. Check items in which you are interested in list below.

NEW EQUIPMENT

Westinghouse . . . Capacitor Units ☐
Lapp . . . . . Bushings ☐
Strato-Tower . . . . . Platform ☐
Thomas & Betts . . . . . Tap ☐
C & D . . . . . Batteries ☐
Fisher-Pierce . . . . . Relay ☐
Kidde . . . . . Fire Extinguishers ☐
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Glastic . . . . . Insulator ☐
Principle Research . . . . . Monitor ☐

OTHER

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Manufacturers Editor
Electrical World
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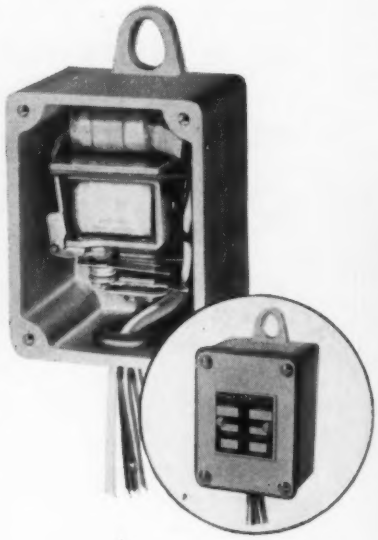
FOR:

Reference . . . . . ☐
Specs . . . . . ☐
Trial . . . . . ☐
Purchase . . . . . ☐

MAY 25, 1959

Multiple Relay . . .

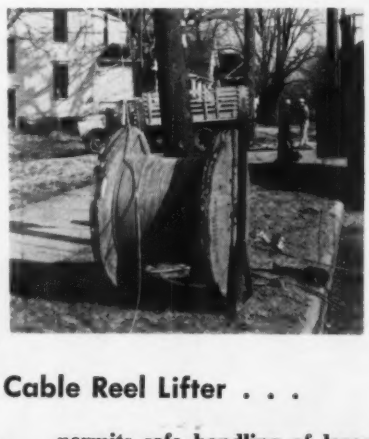
(*Continued from page* 98)



ning protection. It can multiply the load handling capability of a single photoelectric control.
Fisher-Pierce Co, 60 Pearl St, S Braintree 85, Mass.

Fire Extinguishers . . .

. . . of the pressurized wet chemical portable type are now available. The new 2½-gal water and 2½-gal loaded stream units stress simplified, self-evident operation for anyone picking up one in an emergency.
Walter Kidde & Co, 675 Main St, Belleville 9, N. J.



Cable Reel Lifter . . .

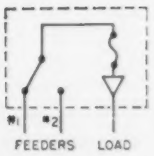
. . . permits safe handling of large reels with broken or damaged flanges. The Hykon Reelift lifts the reel and supports it on an axle, permitting the reel to turn freely. The device enables two men to mount fully loaded reels of 750,000 MCM without using rollers, patched flanges, jacks or risky make-shifts.
Hykon Mfg Co, Box 923A, Alliance, Ohio.

Standoff Insulator . . .

. . . meets all NEMA A-20 specifications for the support of current-carrying parts within electrical equipment when exposed to temperatures not exceeding 150C. Weight of the 5-kv flame-retardant, high-strength glass reinforced polyester insulator is 2 lb.
Glastic Corp, 4321 Glenridge Rd, Cleveland 21, Ohio.

Three-Phase Monitor . . .

. . . gives visible and audible signals of unbalanced transformer loads, grounds, single-phasing and loose connections. Minimum and maximum voltage warning points can be set for each phase of any 3-phase system.
Principle Research & Development Corp, 200 Citizens Building, Aberdeen, S. Dak.



UNICLAD with feeder selector oil switch, 3 pole, 15 kv, 400 ampere full load break and three disconnect type power fuses.

G & W SWITCHGEAR—TO SUIT *YOUR* REQUIREMENTS

Profit by G&W's experience in designing and manufacturing countless combinations of switchgear to suit customers' specifications and budgets. A solution to your problem may exist in our files. Or a slight modification of a similar installation may save you hundreds of dollars in engineering time.

Typical of the G&W line of switchgear—rated from 5.0 to 34.5 kv, 75 to 200 kv BIL—is the Uniclad illustrated. It is a G&W "custom" job made to suit the plant layout and operational convenience of a large west coast laboratory. Four such units serve as primary service entrance switches to the plant. In each, standard components were used. A three position selector is used to transfer the feeder circuits manually (provision is made for adding an automatic control) in the G&W load break oil switch. Installation at the site is simplified by assembling all components at our factory in the trim looking Uniclad (metal enclosure).

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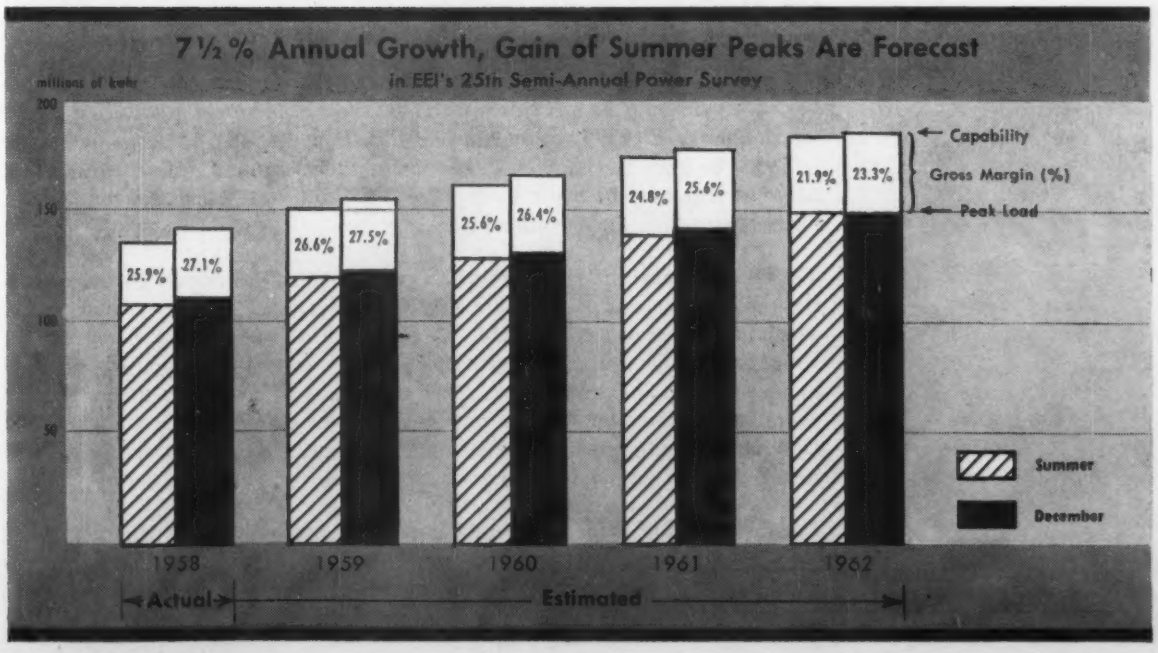
EEI Sees Steady Growth Ahead

Report on
Electrical Business Outlook

Industry growth is still running between 7% and 8% a year, according to Edison Electric Institute's 25th Semi-Annual Electric Power Survey. The latest survey, released last week, shows that estimates of peaks, capability, and output have been shaved slightly since six months ago; but compounded annual growth rates for the five-year period 1957-1962 are still 7.5% for the December peak, 7.7% for capability, and 7% for output.

Summer peak loads are still creeping up on December peaks, the survey shows, and by 1962 the two peaks are slated to be almost identical. Annual load factors will show small improvements and margins will be ample through 1962. Here are some highlights from the latest survey (all data shown are based on median hydro conditions, with output reported by 99% of the industry, 98% capability):

- **December peak load this year will reach 124,473,000 kw, an increase of 9.8%** over last December's peak. By 1962 it will be 153,121,000 kw.
- **This summer's peak will rise to 121,644,000 kw, up 11.4% from last year.** In 1962 the summer peak will be 152,380,000 kw, about 99.5% of the expected peak for the following December.
- **Capability increased by 10.4% last year—to 144,171,000 kw.** Another 10.1% increase is scheduled for this year, and total capability of the power systems in the contiguous U. S. is placed at 188,754,000 kw by the end of 1962.
- **Gross margin for December 1958 was 27.1%.** Comparable forecast for 1962 is 23.3%. Summer gross margins range from 26.6% for 1959 to 21.9% in 1962.
- **Output for 1959 is forecast at 705,918,000 kwhr—up 10.1% from 1958.** By 1962, total output of 877,333,000,000 kwhr is expected.



Summer Peak Loads (Thousands of Kw) expressed as % of following December peak								
	1959		1960		1961		1962	
Region	Summer Peak	% of Dec '59	Summer Peak	% of Dec '60	Summer Peak	% of Dec '61	Summer Peak	% of Dec '62
1	25,219	93	27,136	94	29,026	95	30,923	96
2	21,562	94	22,721	92	24,468	93	26,072	95
3	22,825	92	24,909	92	26,987	92	29,130	93
4	14,543	100	15,572	101	16,641	102	17,765	103
5	14,342	134	15,932	134	17,503	135	19,288	139
6	2,649	100	2,894	100	3,120	100	3,413	100
7	8,550	85	9,425	86	10,370	87	10,886	86
8	11,954	102	12,901	103	13,892	102	14,903	103
Total U.S.	121,644	98	131,490	98	142,007	99	152,380	100

Values for total U.S. are sum of regional totals and do not reflect the fact that maximum loads occur in December for most regions.

The most significant trend developed is a resumption of normal growth, following the recession of 1957-1958. The EEI Electric Power Survey Committee summed it up this way: "The results of this survey, which reflect the thinking of a great number of individuals in the many power systems throughout the country, disclose the expectation of steady progress during the period covered by the forecasts, with no abrupt changes in the future course of events. Although, as now foreseen, the general level of loads during the period may be a shade lower than forecast in the previous survey, the average annual rate of growth indicated remains much the same as predicted earlier."

The recession threw many relationships out of line, and this tempers any year-to-year comparison of data. For example, the drop in industrial production in the fourth quarter of 1957 brought that year close to having an overall summer peak. In 1958 the industrial climate worked the other way around, with the result that only two regions—the South Central and the Southwest—showed summer peak loads higher than the December peaks.

The recession also exerted its effect on gross margins. Since new capacity additions to cover normal growth were already underway before the recession struck, capability progressed considerably faster than load while it was going on. In 1958, for example, capability went up by 10.4% while the December peak rose by only 6.1%. The result is that 1959 gross margins are higher than originally expected—in seven out of eight regions and in the contiguous U. S. as a whole. Only in the Southwest are summer and winter gross margins lower than those reported in the 24th Power Survey last October.

But the recession made its deepest impression on output. For the contiguous U. S., 1958 electric energy output was only 2.3% higher than it had been in 1957—an exceedingly small gain compared with the average annual 9.7% increase during the previous ten years. Two regions actually showed a decline

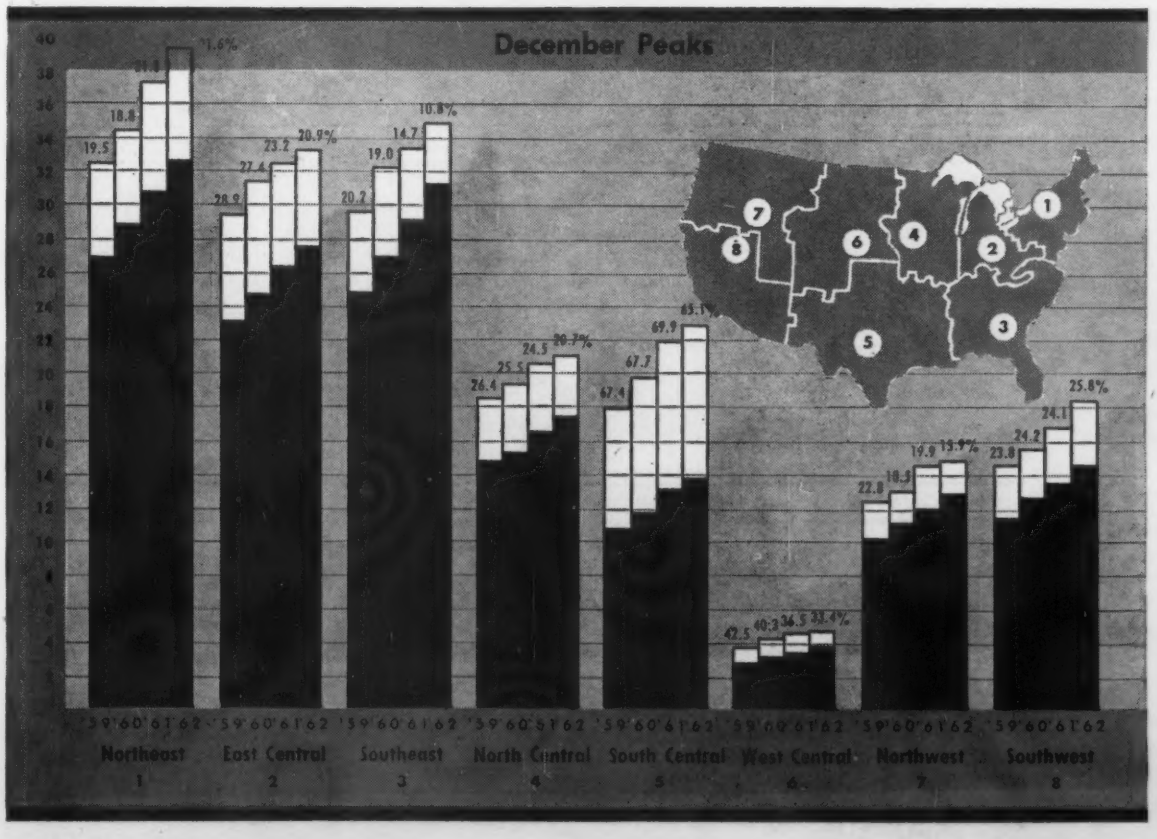
in 1958: Output in the heavily-industrialized East Central Region was off 0.4%, and the Northwest showed a 3.6% decline below the 1957 level.

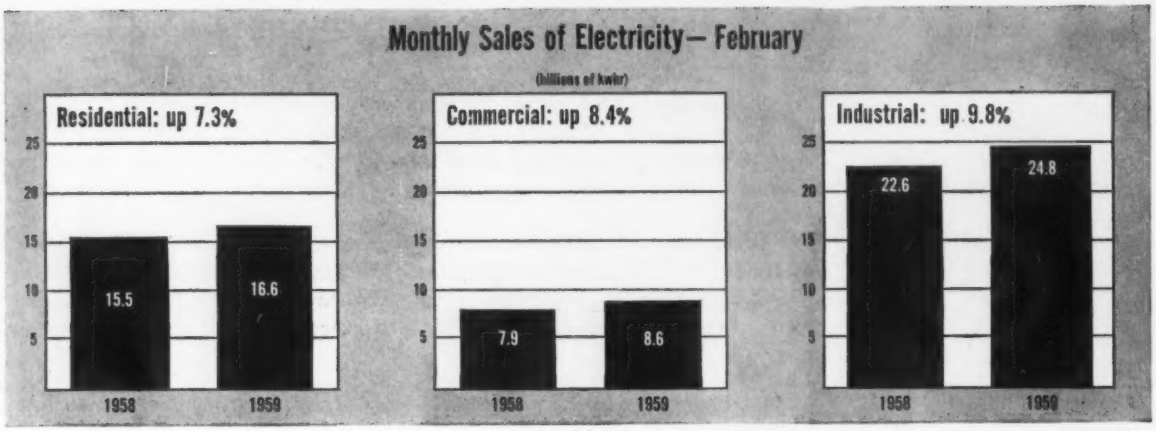
Present forecasts of output are lower than those in the last survey. In the two regions mentioned above, and also in the South Central, 1959 forecasts now average about 3% lower than six months ago. On the other hand, the forecast for the Southwest shows a slight increase.

The South Central Region leads in output growth, with a 50% increase expected by 1962. For 1959, however, the fastest growth is due in the Northwest—13.3% over last year's recession-blasted output. The slowest growth, for 1959 and also for the five-year period through 1962, is expected in the North Central Region.

Annual load factor for the contiguous U. S. dropped to 64.5% in 1958, from a level of 66.9% in 1957. Over the next four years, it is expected to climb gradually back up to 65.4%. This picture varies a great deal regionally, however, with four regions showing continued gradual declines while four show increases. Highest load factor in '62 will be 68.3%—in the East Central Region.

The recession's direct effects on power output, peaks, and capability are over. But the 25th Semi-Annual Power Survey indicates that it will be a while before indirect effects are entirely shaken out. This shows particularly in equipment ordering. As the EEI committee put it: "With the gradual return to what appears to be a normal situation, power demands are expected to resume their earlier growth pattern and gross margins are likely to fall to lower levels. Meanwhile it is natural that orders for new electric generating capacity should drop substantially below the previous levels. However, power system loads appear to be returning to their normal rate of growth and it is to be expected that orders for additional equipment will soon return to more normal levels."





Power Statistics

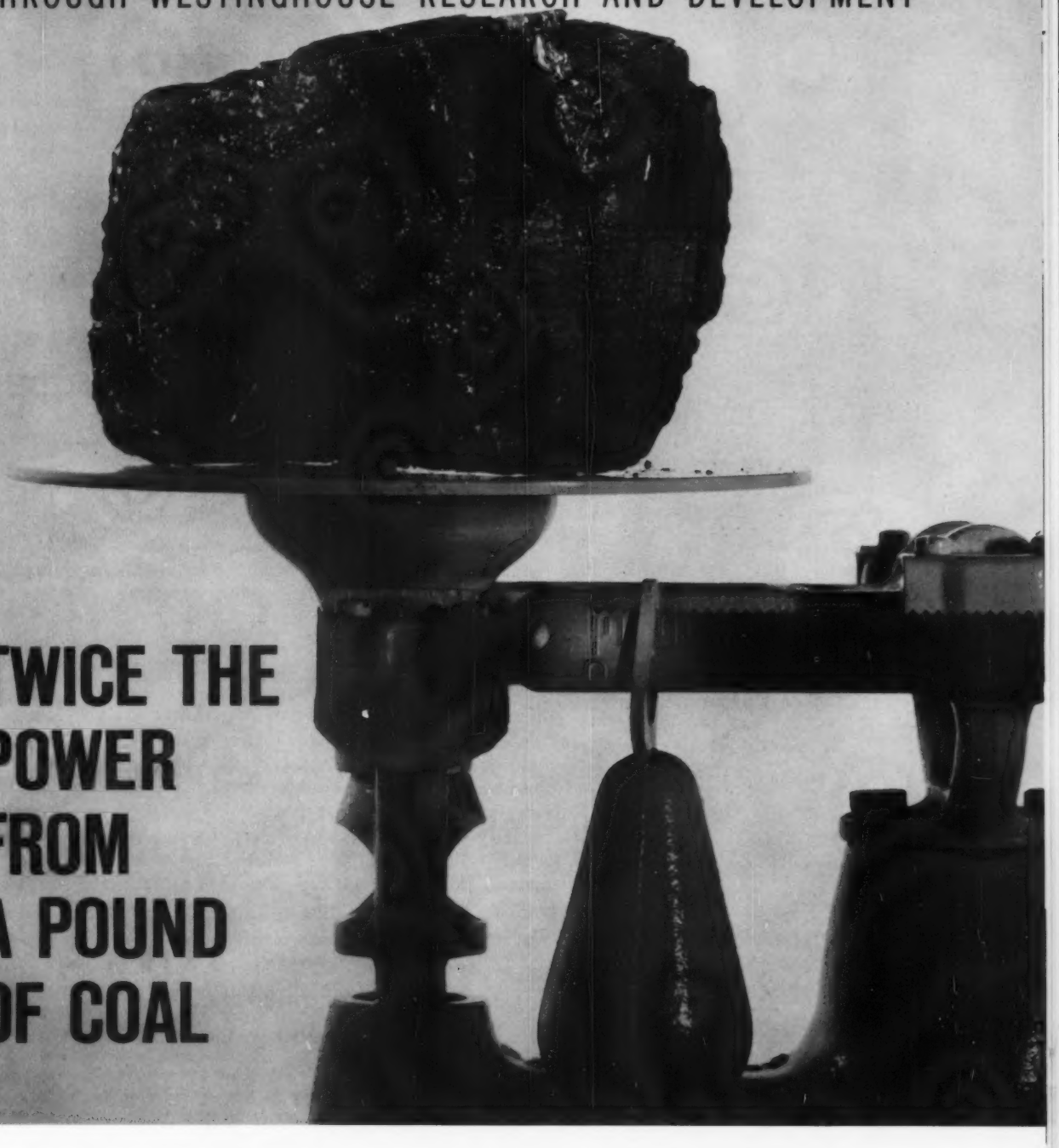
		Latest Month	Year Ago	Annual Change %
Capacity	Feb.	144.52	129.86	11.3
Peak—Class I Systems, million kw	Dec.	107.1	102.4	4.6
Estimated Dec. '59 Peak	Feb.	124.9	128.6	− 2.9
Production—billion kwhr	Feb.	54.16	50.06	8.2
Hydro		10.67	10.97	− 2.7
Fuel		43.49	39.09	11.3
Sales—billion kwhr	Feb.	52.68	48.48	8.7
Residential		16.63	15.50	7.3
Commercial		8.58	7.91	8.5
Industrial		24.83	22.62	9.8
Other		2.63	2.45	7.3
Fuel Consumption	Feb.			
Coal—million tons		14.21	13.57	4.7
Oil—million barrels		8.85	6.44	37.4
Gas—million cu ft		81.77	75.57	8.2
Net Income Class A & B Co's—$ million	Feb.	165.01	146.75	12.4
Residential Customers—millions	12 mos.	49.29	46.86	5.2
Revenue per kwhr	ended	2.53¢	2.55¢	− 0.8
Avg kwhr per customer	Jan. 31	3,395	3,197	6.2
Avg annual bill		$85.89	$81.52	5.4

Business Statistics

Indexes: 1947 − 49 = 100				
FRB Industrial Production	Apr.	150	127	18.1
ENR Construction Cost	May	165.7	157.6	5.1
BLS Cost-of-living	Mar.	123.7	123.3	0.3
New Orders for Machinery (1950 = 100)	Mar.	182	134	35.8
NEMA Sales				
Insulation materials	Feb.	138	106	30.2
Electric appliances		98	77	27.3
Wholesale prices				
Motors and generators	Feb.	146.4	146.3	0.1
Transformers and regulators		148.8	148.8	....
Switchgear and fuses		171.9	171.9	....
GNP—annual rate—$ billion	1st qtr.	467.0	425.0	9.9

Significant changes: Unusual behavior of "residential customer" data is due to reclassification which adds customers previously carried as "rural." The 1959 figures are not comparable to 1958.

THROUGH WESTINGHOUSE RESEARCH AND DEVELOPMENT

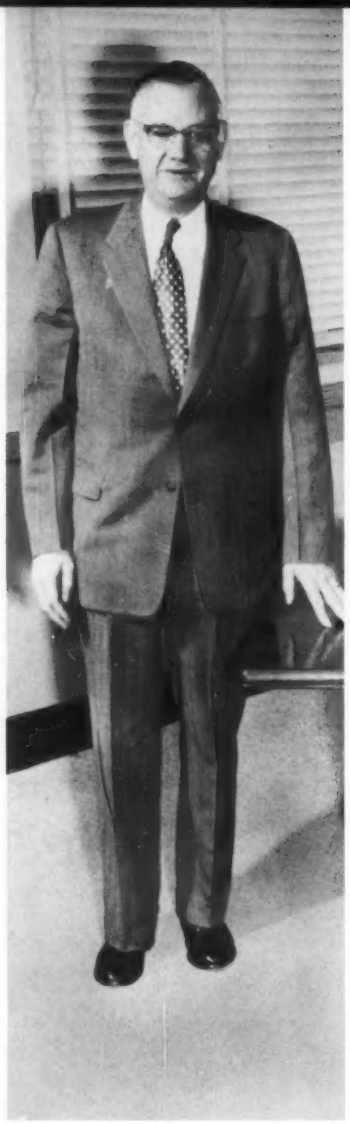


TWICE THE POWER FROM A POUND OF COAL

In the early 1920's, utilities had to use 1½ pounds of coal to produce enough steam to generate one kwhr. Since then, research and development have cut this costly coal consumption by more than 50% . . . and we're getting still more power from that pound of coal every day! In addition to fuel economies, Westinghouse research and development efforts have increased the capacities of generating equipment to the point where today's electric utilities can be equipped to meet power loads of any magnitude in the foreseeable future.

On the next three pages are a few of the advances being made by Westinghouse scientists and engineers to help America's electric utilities meet future power needs even more economically.

YOU CAN BE SURE...IF IT'S Westinghouse



J. R. Carlson,
Division Engineering Manager,
Westinghouse Steam Division

STEAM AT 12 TIMES THE SPEED OF A HURRICANE!

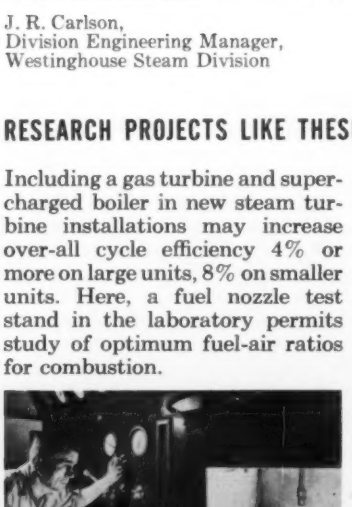
Today's turbine is a controlled storm. As much as two million pounds of high-pressure steam blast through its blades every hour at velocities 12 times faster than a hurricane!

This tremendous volume cools from 1050° F to 80° F in a fraction of a second. The speed of the longest blades is greater than that of sound. Today's steam turbine runs for months without a shutdown for inspection, and 30 to 40 years without replacement. Still, Westinghouse turbine designers are constantly striving for higher temperatures and pressures, stronger materials, and reduced fuel consumption.

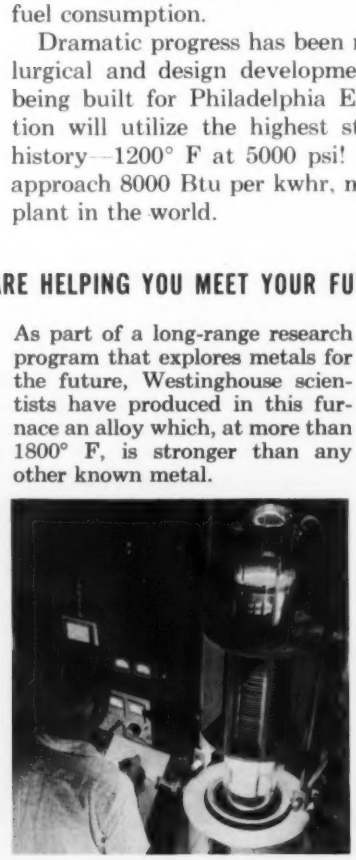
Dramatic progress has been made through Westinghouse metallurgical and design developments. A superpressure element now being built for Philadelphia Electric Company's Eddystone Station will utilize the highest steam temperature and pressure in history—1200° F at 5000 psi! The over-all station heat rate will approach 8000 Btu per kwhr, making this the most efficient power plant in the world.

RESEARCH PROJECTS LIKE THESE ARE HELPING YOU MEET YOUR FUTURE POWER NEEDS ECONOMICALLY

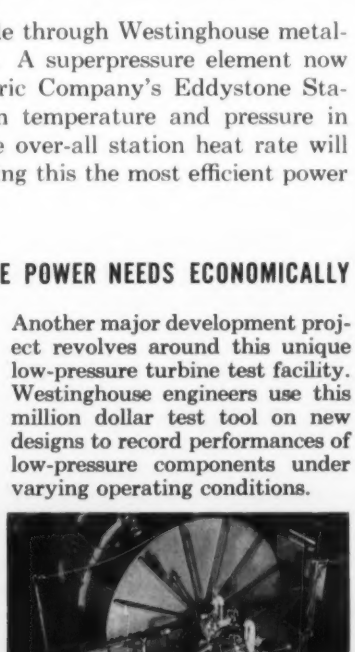
Including a gas turbine and supercharged boiler in new steam turbine installations may increase over-all cycle efficiency 4% or more on large units, 8% on smaller units. Here, a fuel nozzle test stand in the laboratory permits study of optimum fuel-air ratios for combustion.

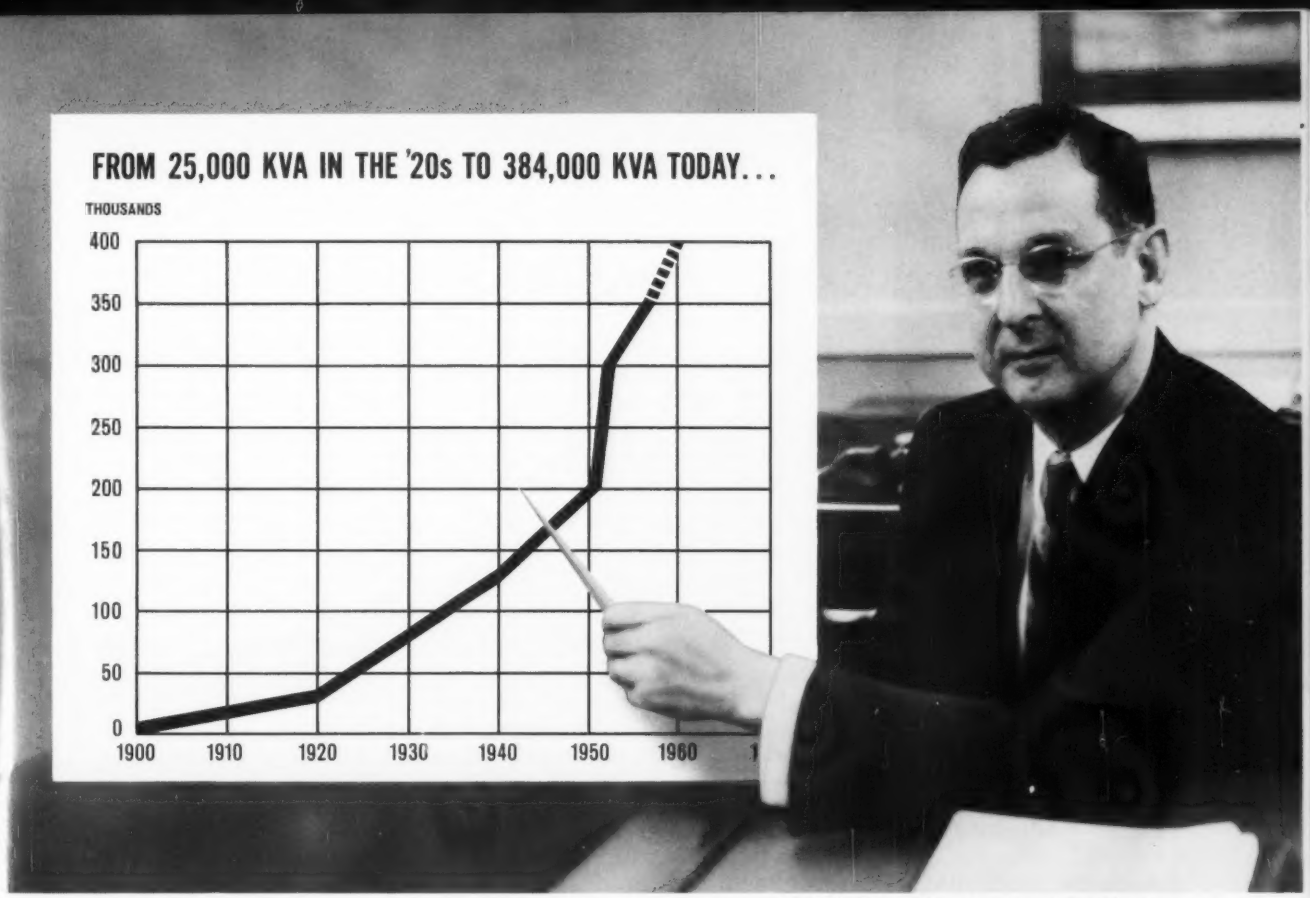


As part of a long-range research program that explores metals for the future, Westinghouse scientists have produced in this furnace an alloy which, at more than 1800° F, is stronger than any other known metal.



Another major development project revolves around this unique low-pressure turbine test facility. Westinghouse engineers use this million dollar test tool on new designs to record performances of low-pressure components under varying operating conditions.





A. M. Harrison, Manager, Large Rotating Apparatus Department, Westinghouse Electric Corporation

. . . AND WE'RE NOW DESIGNING GENERATORS BEYOND THE RANGE OF THIS CHART!

From 1900 to 1920, generators were air-cooled; progress to larger capacities was slow. Maximum ratings of 3600-rpm generators reached only 20 to 25,000 kva. The use of hydrogen as a coolant was the first major break-through. It remained then to increase the pressures of the gas in order to build larger units. As these pressures went from ½ pound up to 30 psi, it appeared that a true maximum had finally been reached—200,000 kva in the early 1950's.

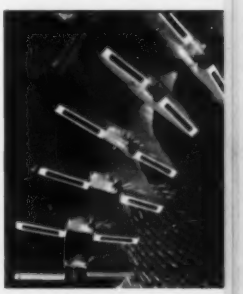
Then, the second big break-through occurred—Inner-Cooling. This permitted unit ratings to increase to the point where, today, the largest single-shaft, 3600-rpm generator unit is rated at 320,000 kva. This unit has been in service for more than two years.

Westinghouse is now building an even larger unit for Arkansas Power & Light Company, rated at a giant 384,000 kva, and is designing generators as much as 30% higher. These may be the largest single-shaft generators required for some time to come, but the end of the line is not yet in sight!

TWO REVOLUTIONARY WESTINGHOUSE ADVANCES ARE RESPONSIBLE FOR THESE HIGH CAPACITIES

THERMALASTIC® INSULATION—Thermalastic insulation has a unique molecular structure which permits expansion and contraction of windings without injurious deformation throughout the life of the machine. Operating voltages cannot get through the fish-scale barrier of large mica splittings which are locked in a memory-type elastic bond.

INNER-COOLING — This Westinghouse-pioneered system circulates hydrogen through the inside of the rotor and stator windings, providing intimate contact with the conductors where heat originates. Inner-Cooling has doubled single-shaft ratings and has greatly reduced size and weight of equipment.



YOU CAN BE SURE...IF IT'S **Westinghouse**

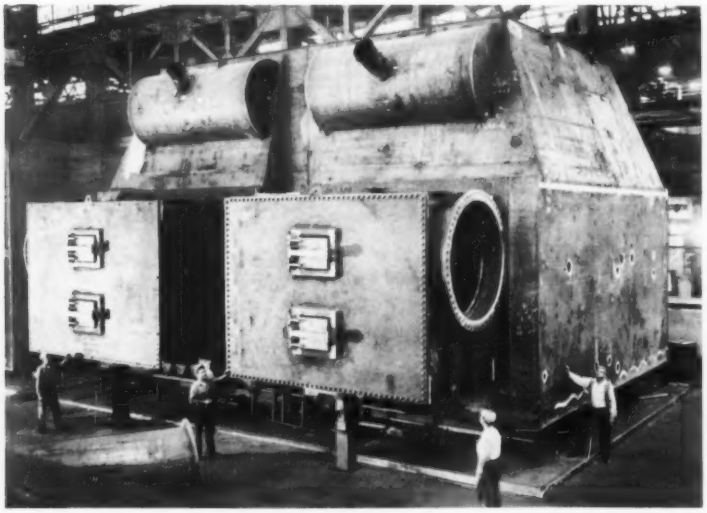
M. A. Nelson, Manager,
Heat Transfer Engineering,
Westinghouse Steam Division

WESTINGHOUSE CONDENSERS GIVE YOU HIGHEST POSSIBLE HEAT TRANSFER EFFICIENCY

FROM RESEARCH AND DEVELOPMENT COME THE MOST ADVANCED DESIGNS

Over the last 50 years, Westinghouse has developed many of the basic condenser designs that today help the electric utility industry to produce low-cost power. Among these advances are the radial-flow principle, air ejectors, steel diaphragms for tube expansion, vertical propeller pumps and reverse-flow valves.

Another significant step was taken with the 150,000-sq-ft surface condenser for the Philadelphia Electric Company's new Eddystone Station. Westinghouse and Philadelphia Electric engineers jointly developed two "firsts" in condenser design.



The detection and location of even the smallest leaks are made possible by 20 sampling compartments in the condenser's upper hotwell and collecting trays below the tube sheets. The lower hotwell is divided into three sections. If the condensate in any section becomes contaminated, it can be bypassed into a water tank for processing before returning to the heat cycle stream.

To protect the condenser from high-pressure and high-temperature steam during start-up or in the event of a trip-out or emergency, the steam is diverted through four injection coolers, which desuperheat the steam and reduce its pressure before it enters the condenser.

JI-50604

RESEARCH DEVELOPMENTS NOW UNDERWAY

LOWER COST FOUNDATIONS—Westinghouse research and development engineers are exploring new structural designs that promise to slash the weight and size of surface condensers and result in lower costs for foundations.

DROPWISE CONDENSATION FOR IMPROVED HEAT TRANSFER — Westinghouse is evaluating water repellents which show promise of keeping the tubes nonwettable *throughout the life of the condenser*. This will result in improved heat transfer rates . . . and permit a great reduction in the size, weight and cost of condensers.

REDUCTION OF AERODYNAMIC LOSSES—Westinghouse engineers are probing means of reducing all the interrelated causes of aerodynamic losses in the transition section between the turbine and the condenser. This will result in design changes that will give the industry condensers that are not only smaller, but more efficient.

MATERIALS FOR LONGER LIFE—In the Westinghouse Steam Development Laboratory, engineers are busy studying ways to prolong the life of waterboxes and pump components by utilizing newly available materials and protective coatings.

Westinghouse turbine, generator and heat transfer consultants are available at any time to discuss your power generation needs with you. Contact your Westinghouse sales engineer, or write Westinghouse Electric Corporation, P.O. Box 868, Pittsburgh 30, Pa.

YOU CAN BE SURE...IF IT'S **Westinghouse**

WATCH "WESTINGHOUSE LUCILLE BALL-DESI ARNAZ SHOWS" CBS TV MONDAYS

Philadelphia Replaces Its Gas Lamps

Only some 20 years ago, Philadelphia had almost 40,000 street gas lamps. In this age of electricity, it is even more surprising to remember that gas lamps were still being installed in the city as late as 1948.—The Philadelphia Inquirer.

HAROLD E. MASON, Street Lighting Engineer, Street Lighting Section, Department of Streets, Philadephia, Pa.

As late as ten years ago, there were 22,000 street gas lamps in the city of Philadelphia. But through an extensive modernization program, all of these lamps have been replaced by electric street lights.

When I was put in charge of the Street Lighting Section of the City of Philadelphia in 1949, I found out that gas lights were more than 20 times as expensive as electric lights on the basis of useful light. The Gas Company officials agreed that manufactured gas should not be used for lighting and so a program was started in 1949 to replace the 22,000 gas lights.

The cost for gas maintenance, which included the weekly winding of spring clocks at each gas light, started to rise sharply in 1958 and at the beginning of that year it was decided to do away with this maintenance service, let the lights burn day and night, and replace the 7,000 remaining gas lights in one year.

The replacement of gas lamps on streets has been mostly with 2,500 lumen series incandescent lamps in open suburban type of luminaires.

PHILADELPHIA MAYOR Richardson Dilworth turns off the last gas light. Street Commissioner David M. Smallwood, (left) and the author (right) watch.

At first, our program to replace gas lights with electric lights met with only isolated cases of opposition. The critical test came in 1953 when we started to put up electric lights on Lincoln Drive, a beautiful residential street and a traffic artery. This job was held up, neighborhood meetings were held, and there was much bad publicity. After two citizens' meetings in the managing director's office we felt the protest unwarranted and there was no reasonable alternative.

I was directed by the managing director to go ahead with the original plans. The new lighting was such an improvement that a few months later practically all opposition had melted and since then the gas replacement program has received the support of the public, the newspapers, and from the City administration.

For the new lighting on Lincoln Drive, we used 6,000 lumen lamps at about 110 ft staggered spacing. This Type III distribution gives practically no light on the many homes on this street and thus nullifies one of the anticipated complaints.

21,000 Electric Lights Added

In the ten years since 1949, the electric lights on our streets have increased from 34,957 to 55,943.

Our costs for power and maintenance have increased from $1,570,183 to $2,316,583. During this time, the useful light on Philadelphia streets has increased from 52 million lumens to 135 million.

Because of the savings resulting from the replacement of gas lights, and from the transfer to City ownership and operation of the street lighting system in 1955, the total costs for gas and electric lighting for 1955 to 1958 has been less than the costs in 1952 to 1954. This is true even though hundreds of miles of streets have been added and much of the old lighting modernized.

In 1949, of the 22,000 gas lights in Philadelphia, 6,500 were in alleys. We now have 13,743 electric alley lights in Philadelphia. In the 1940's many were constructed by using cast iron adaptors on top of discontinued gas posts. For a few years these posts were constructed from wrought iron pipe. In recent years we have used tapered aluminum poles.

Up to 1958, electric clock switches were used to turn the lights on and off, but with the advent of tubeless photo-electric control we turned to this method, and now about 2,000 of our alley lights have photo-electric control.

The last gas light maintained by the City was turned off on April 15 by the mayor. This gas lamp and post, which was installed in 1893, was removed by the Philadelphia Gas Works and presented to the Franklin Museum in Philadelphia.

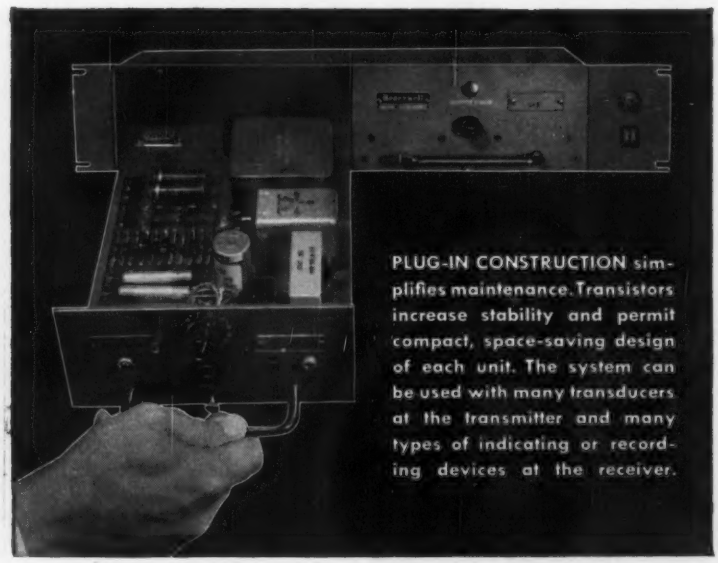
There will be perhaps 10 gas lights maintained by private individuals in the City on private property.

(*More Selling on page* 114)

Millivolt-to-current transducer converts the mv signal of the sensing element to current.

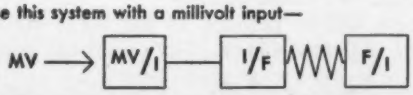
Current-to-frequency transmitter converts current to a transmittable frequency that is a measure of the original variable.

Honeywell telemetering system



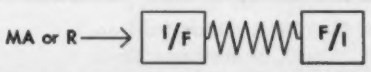
PLUG-IN CONSTRUCTION simplifies maintenance. Transistors increase stability and permit compact, space-saving design of each unit. The system can be used with many transducers at the transmitter and many types of indicating or recording devices at the receiver.

Use this system with a millivolt input—

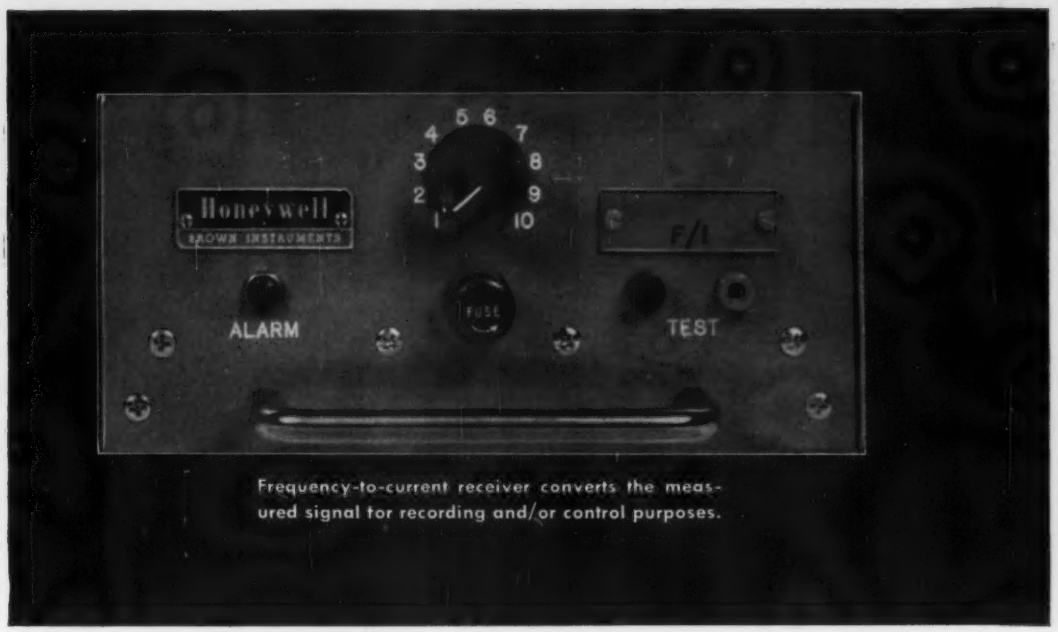


Millivolt-to-current and current-to-frequency units transmit to a frequency-to-current receiver

Use this system with a milliamp or resistance input—



Current-to-frequency unit transmits to a frequency-to-current receiver.



Frequency-to-current receiver converts the measured signal for recording and/or control purposes.

is fully transistorized

...for greatest long-term reliability

Solid-state components scale down the size and build up the reliability of this Honeywell telemetering system. It consists of three basic units—transducer, transmitter, receiver—that can be used in different combinations to provide the particular type of frequency telemetering you require . . . frequently at a substantial saving. Modular construction makes possible this unusual flexibility.

With transistors instead of tubes, this fast-response, frequency-type system consumes little power, generates little heat. The compact units mount two-abreast in relay racks.

Use this highly accurate system for telemetering load, control intelligence, or any variable that can be transduced into an electrical signal. It's designed to meet all central station requirements, and is suitable for carrier, microwave, or direct wire line channels.

Your nearby Honeywell field engineer can give you complete details. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

Honeywell

H HONEYWELL *First in Control*

Electric Pressing Doubles Business

GRANVILLE J. HAVEN, Industrial Engineer, Union Electric Co, St. Louis, Mo.

Alta Hufnagel, manager of the Berkeley Laundry, St. Louis, Missouri, says her business has more than doubled since moving to her new location in the summer of 1957. She attributes this increase in business not only to the new location but to the excellent quality of the pressing job done on the shirts by the all-electric pressing units which she has installed.

In her own words, "The finish on the shirts ironed in these all-electric units is much better than the finish given by any other method I have seen used in my more than 33 years in the laundry business. I also like the electric units because they are fast, clean, cooler and very economical to operate. It is very nice to be able to start up and stop these machines by simply flipping a switch."

Each complete pressing unit has a connected load of 8,200 w and uses less than six kwhr. At an average rate of 2.5¢ per kwhr this means each unit costs approximately 15¢ per hour to operate. One operator with reasonable skill can complete 25 shirts per hour. This results in a total cost for electric heat of less than ⅔¢ per shirt.

Live Better Electrically Wins PR Award

Paul Gavaghan, right, press relations director of Live Better Electrically, accepts the American Public Relations Association's Silver Anvil award from Stanley House, APRA awards committee chairman. LBE received the award for public relations activities in the utilities field with the Medallion Home program, based on a 65-page summary outlining the program's planning, local follow-through, and measurement of results. The Silver Anvil is the Association's highest award.

Heat Pumps Eliminate Egg Aging Problem

W. L. STREICH, Commercial Sales Representative, Wisconsin Electric Power Co, Milwaukee, Wis.

Two, 1½-hp heat pump units have been installed at the Stiehm Butter & Egg Co, West Allis, Wis., to provide year-round comfort for employees, reduce egg aging, and eliminate spoilage in the area where the eggs are sorted, candled, weighed and crated.

The company operates a wholesale egg business and buys ungraded and unsorted eggs directly from farmers. They handle 180,000 eggs, or approximately 500 cases, per week.

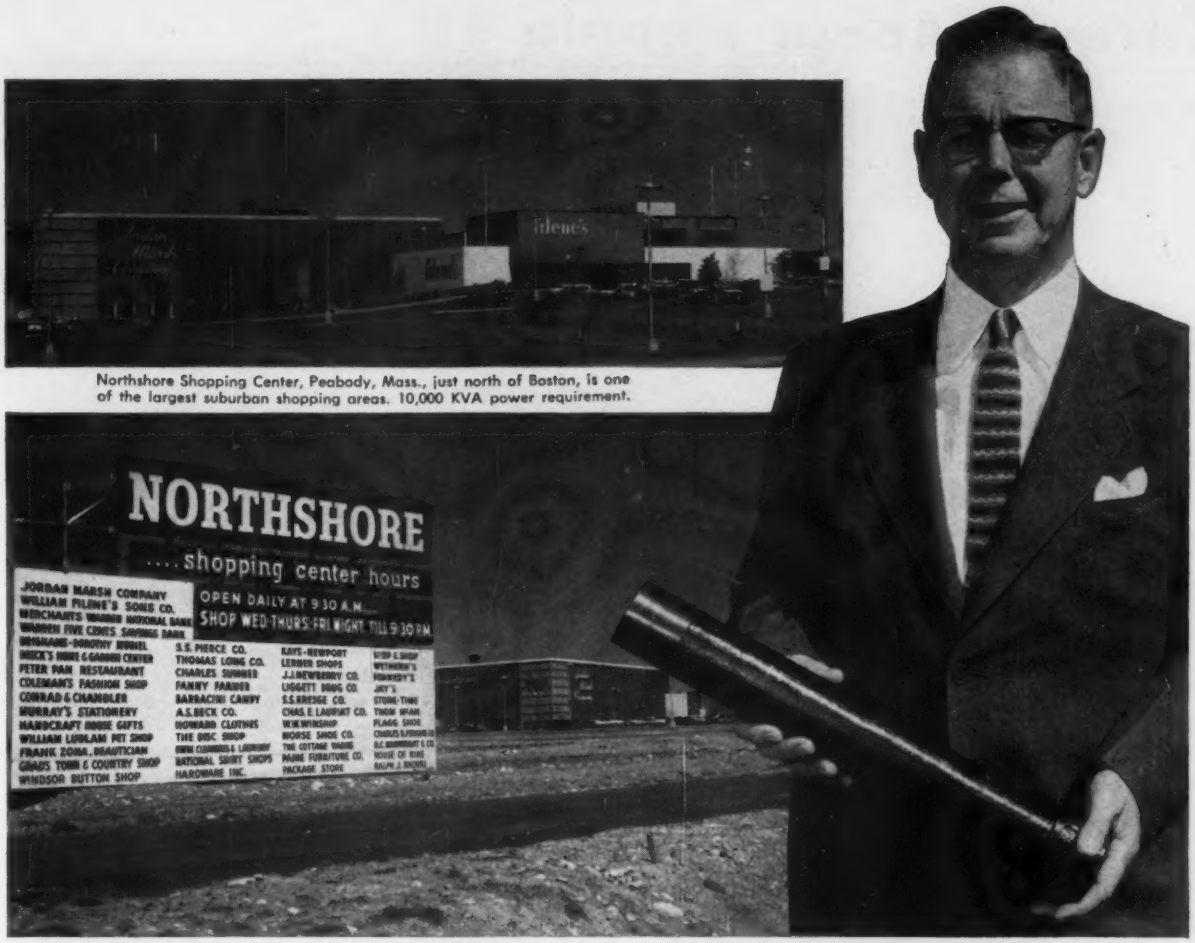
Their building is of concrete block construction, 40x60 ft with an 11-ft ceiling. There is no insulation. It is partitioned into four areas: The office and utility room area; a refrigerated area where eggs and butter are stored when necessary; a shipping and receiving room; and a 25x25-ft area where sorting, candling and weighing are done.

This latter area was formerly heated inadequately by a tap off the trunk of the main gas fired heating system. There was no air conditioning and it was too hot in winter and too cold in summer. The high summer temperature caused rapid aging of the eggs and egg spoilage.

The air conditioning units operate reverse cycle as heating units from outdoor temperatures of 60 to 15F. When the temperature reaches 15F an external thermostat cuts out the compressor and heat is supplied from 3 kw of electric resistance heaters in each unit. Heat pump ratio in the 60 to 40F range is 2:2.5:1.

Electric Heat Sign

All electrically heated homes in the West Penn Power Co service area are decorated with a sign produced by the company and designating the residence as "another electrically heated home." The sign, produced by the utility's display shop, includes blank, screening and angle iron for erection and costs approximately $7.50. The metal blanks are purchased from a local sign supply firm.



Northshore Shopping Center, Peabody, Mass., just north of Boston, is one of the largest suburban shopping areas. 10,000 KVA power requirement.

"Putting in BERMICO CONDUIT was the easiest part of the job"

AL KENWORTHY,
Electrical Contractor, Everett, Mass.

"When I saw the area to be wired, I expected the worst," reports Mr. Kenworthy, President of Kenworthy & Taylor. "It was craggy, rooted, and uneven."

"Luckily, Bermico was the specified conduit. Bermico is lightweight. It's easy to work with . . . its fittings simplify every installation problem. Putting in Bermico Conduit was the easiest part of the job."

For fast, money-saving installations . . . use Bermico on all your jobs. Bermico is made from cellulose fibre, impregnated with coal tar pitch. Each 8-foot length is precision engineered, with smooth inside bore to allow easy cable pull-through without abrasion. It has high dielectric strength. Bermico is long lasting, too . . . extremely resistant to acids, alkalies, heat, water and corrosion. Try it.

Distributed by WESTINGHOUSE Electric Supply Company
Offices in Principal Cities

Another Quality Product of

BROWN QUALITY COMPANY

General Sales Office: 150 Causeway Street, Dept. 1359, Boston 14, Mass. *Mills:* Berlin, N. H.; Corvallis, Oregon

News About People

EDWARDS

ROHRBAUGH

RATHBUN

Western Light & Telephone Elects Three VPs

Western Light & Telephone Co has elected C. F. Edwards, vice president in charge of commercial operations; H. V. Rathbun, vice president in charge of transmission and distribution; and E. C. Rohrbaugh, vice president in charge of production.

Edwards joined the company in 1957 as general commercial manager. He had previously been a vice president with Southwest Kansas Power Co. Rathbun became general superintendent of the electrical department in 1951, and manager of transmission and distribution in 1957. Rohrbaugh joined the utility in 1951 as production manager.

Poole Named VP-Sales of Toledo Edison

William R. Poole has been named vice president in charge of sales of Toledo Edison Co.

After four years with General Electric Co as an industrial lighting engineer, Poole joined Toledo Edison in 1936 as a commercial lighting salesman. From 1943 to 1948 he was a member of the Toledo Chamber of Commerce, and then returned to Toledo Edison as a supervisor of appliance sales. In 1951, he organized the company's industrial development department.

In 1956 he was named residential sales manager, and, in 1958, was named to the newly created post of general sales manager, and elected to the board of directors.

CIPS Appoints Borchers a VP

A. J. Borchers has been named vice president of Central Illinois Public Service Co.

He has been associated with CIPS for 39 years, and has served as division engineer in all three of the utility's operating divisions. In 1936, he was named manager of the Southern Division, and served in that capacity until 1943 when he became operating engineer, the post he now holds.

He started his career as a line and substation construction foreman with Wisconsin Power, Light & Heat Co.

(*More News About People on page* 118)

A 15-kv 400-amp station-type disconnect at a distribution disconnect price

No Sticking!...No Burning! No Pitting!...No Welding Shut!

Silver-weld contacts, a unique new development, provide 20,000 ampere momentary rating for this distribution disconnect

How is it possible to get this performance?

The answer lies in the methods of applying silver to the contact surfaces.

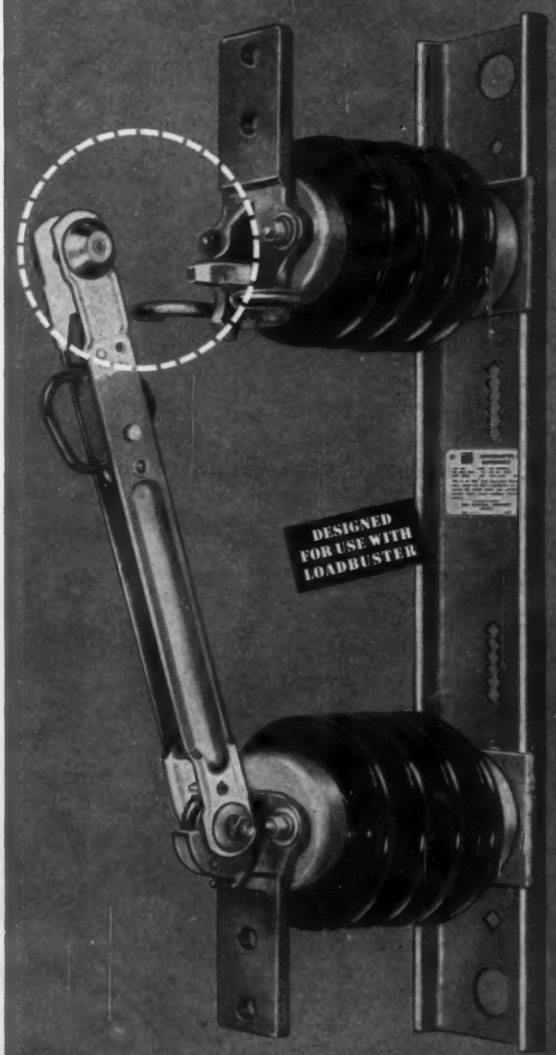
To apply silver to the contact castings, a new, patented process is used which includes special preparation of the contact surfaces, preheating them in a neutral atmosphere, fusing onto them molten particles of silver alloy, and then coining for hardness control, contour, and low porosity.

To apply silver to the blade, another method is used. The blade is silver-clad with extra-thick, high-density, low-porosity silver.

The result is a silver-to-silver contact which does not seize or gall and which makes possible the high current ratings.

But performance of a new disconnect is one matter, and performance after normal usage and exposure to atmospheric contamination is another. In practice, a distribution disconnect may be left in the open or in the closed positions for very long periods, with contacts exposed to corrosive atmospheres, typically without maintenance. Recognizing this fact, S&C has designed a disconnect that will carry its rated load, even after hanging open for long periods. On the other hand, this new S&C disconnect will open without difficulty, even after long exposure in the closed position.

And without extra cost, you get full load switching with LOADBUSTER® when you fit your distribution system with S&C LOADBUSTER Disconnects. Write today for Descriptive Bulletin 721, to S&C Electric Company, 4421 Ravenswood Avenue, Chicago 40, Illinois. In Canada: S&C Electric Canada, Ltd., 8 Vansco Road, Toronto 14, Ontario.



LOADBUSTER® DISCONNECTS

Disconnects • Cutouts • LOADBUSTER® • Load Interrupters • Metalclad Switchgear • Fuse Links • Power Fuses

Specialists in High-Voltage Circuit Interruption Since 1910

GALVANIZED STEEL STRAND FOR GUY, MESSENGER and OVERHEAD GROUND WIRE

The high, uniform, consistently-dependable quality of Crapo Galvanized Steel Strand is the direct result of close laboratory control over each step in manufacture. All wires used in forming a particular size and grade are produced from steel of selected analysis, carefully processed under technical supervision and stranded on precision machines. Both wire and finished strand are subjected to prescribed laboratory tests to insure the desired end result.

Heavy, uniform, tightly-bonded zinc coatings, applied by the famous Crapo Galvanizing Process, provide maximum resistance to corrosion.

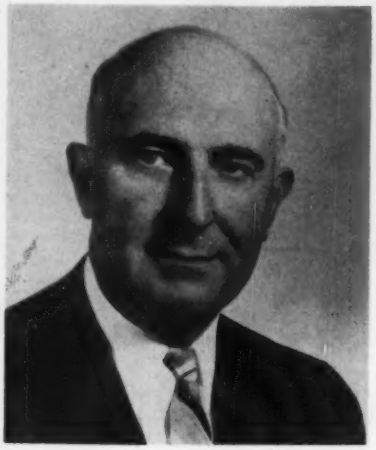
Write for booklet OG-25 containing "Sag and Tension Data for Overhead Ground Wire."

INDIANA

STEEL & WIRE CO., INC., Muncie, Indiana

More News About People

(*Continued from page* 116)



P&K Appoints Barney General Sales Manager

Pfaff & Kendall has appointed Tom Barney general sales manager. He will be in charge of all sales functions of the company, including the lighting and traffic divisions and the special products division.

He was with Westinghouse Electric Supply Co for the past 22 years, most recently as district manager in Texas and New Mexico.

Anderson Gets Additional Duties at B&W

James S. Anderson, vice president in charge of sales for Babcock & Wilcox Co's tubular products division, has been appointed general manager of the division, with broader responsibilities in the operation of the division.

Anderson joined Babcock & Wilcox in 1941. He was named assistant manager of the New York office in 1942, and assistant general sales manager of the tubular products division in 1948. He was promoted to sales manager in 1953, and elected vice president in 1957.

PERSONAL BRIEFS

Eugene Cordon, and **Charles B. Finch,** vice presidents of West Penn Power Co, have been elected to the board of directors.

Glenn Jackson, vice president of California-Oregon Power Co, has been appointed to the three-member Oregon State Highway Commission.

Austin E. Penn, executive vice president of Baltimore Gas & Electric Co, has been elected president of the Maryland Utilities Assn.

W. K. Gwyer has been appointed assistant general manager of the West Kootenay Power & Light Co.

John Van Ness, chairman of the Indiana Public Service Commission has become assistant to the president of Midwest Steel Corp.

John Scofield, Eugene, Ore., Water & Electric Board, is the new chairman of the engineering and operations section of the Northwest Public Power Assn. **William Fell,** Clallam County PUD, is vice president.

Snohomish County (Wash.) Public Utility District has named **Kermit K. Miller** commercial manager.

Charles F. Avila, acting general manager and vice president of Boston Edison Co. has been elected a member of the board of directors.

Public Service Co of Oklahoma has made three engineering appointments: **R. O. Newman** was named superintendent of operations; **E. F. Behrens,** superintendent of construction; and **W. R. Swank,** project engineer in charge of construction at

the company's Northeastern station.

British Columbia Power Commission has named five men to new district manager posts: **J. D. Dobie** to North Okanagan district; **W. B. Gale,** to Prince George district; **R. J. Wark,** to Columbia Valley; **G. E. Fairbaim** to Smithers and **H. Vernon Bigwood** to Quesnel.

Clarence Lietzow has been promoted to superintendent of heavy maintenance for all plants of Toledo Edison Co, and **Robert Blanchong** has been made heavy maintenance engineer.

Two brothers have been honored by Appalachian Power Co for fifty-five years of service: **Charles McCarthy, Jr.,** has been with the company for 30 years, and **Clarence McCarthy** for 25.

Robert E. Jones, an attorney in the legal department of Indianapolis Power & Light Co, has been elected assistant secretary.

Edward A. Rodrigue has been named special assistant to the president and the vice president in charge of operations at Louisiana Power & Light Co.

A. B. Greene, Jr., has been named manager Georgia Power Co's newly created construction department. **W. E. Bradley** was promoted from assistant superintendent to superintendent of construction.

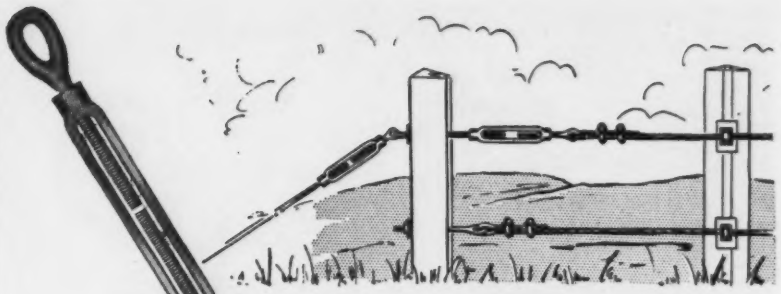
R. H. Thompson, vice president of Central Illinois Public Service Co, and manager of the utility's eastern division operations since 1936, retired April 30.

Mahlon O. Alden has been named local manager of the Newell office of Black Hills Power & Light Co.

Pittsburgh Standard Conduit Co has appointed **James D. Logan** eastern regional sales manager.

Charles A. Larson, formerly with Edison Electric Institute, and before that, Middle West Service Co, and Public Service Co of Colorado, has joined the staff of Boni, Watkins,

(*Continued on page* 122)



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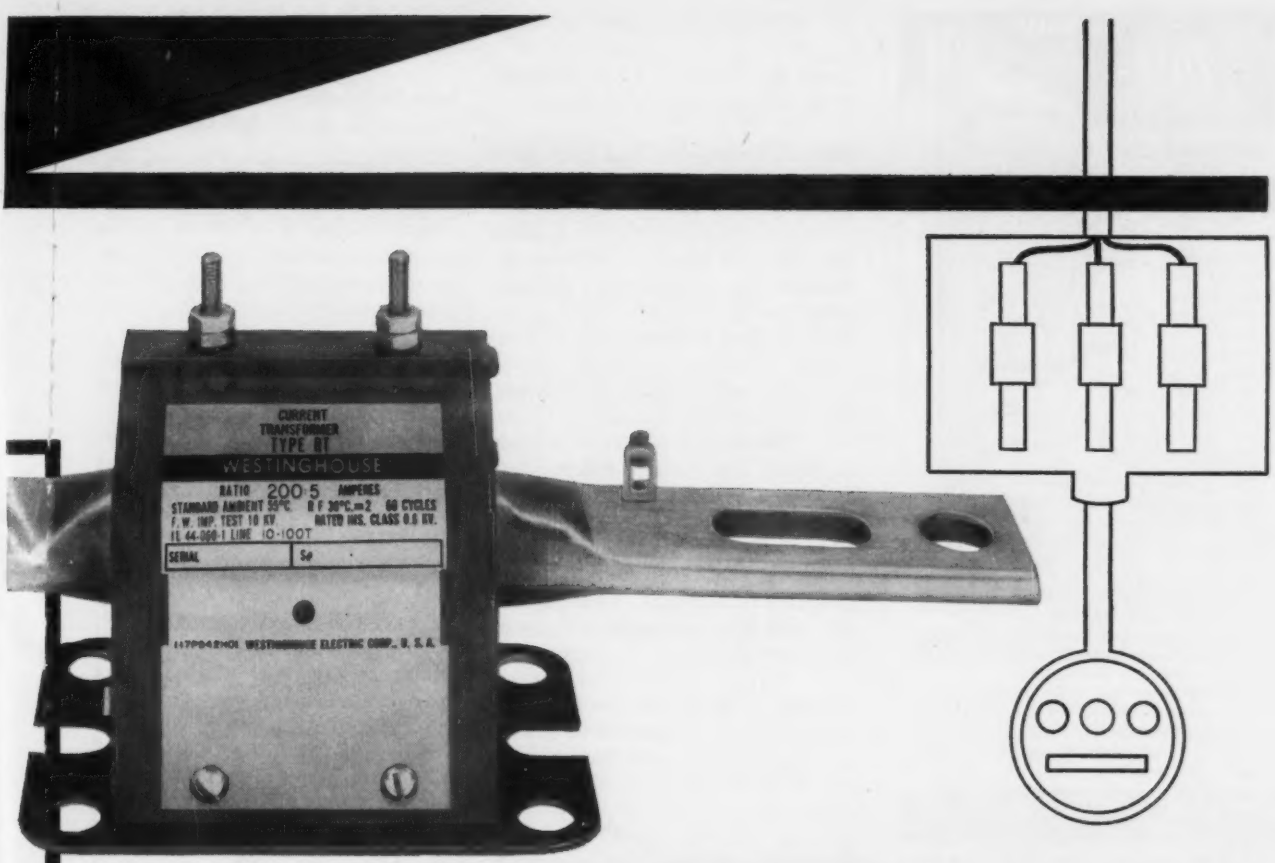

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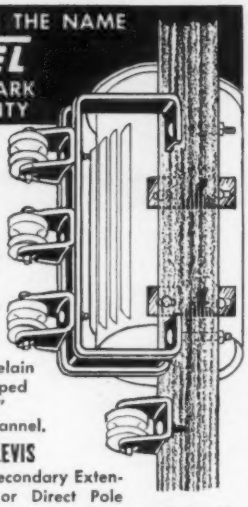

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Keeps wires clear of transformers. Complies with regulations. Sets Secondary Bracket out from pole to center of porcelain 12½". Hot dipped 2" x 3/16" x 5/16" galvanized channel.

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Now! All type O.S. Transformers can be mounted directly to the pole with two thru bolts. Cross bar and channel function are welded all around. All hangers, kickers and adapter plates are hot dipped galvanized. Furnished complete with hot dipped galvanized bolts.

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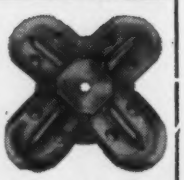
Grip-Tite anchors come with *nut retainer*. Prevents anchor from sliding up the rod during installation. Permits salvage, too.
Exclusive double-strength anchor top prevents damage from expanding tool during installation.



DEPENDABILITY AT LOW COST
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Grip-Tite MANUFACTURING CO.
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(*Continued from page* 119)

Jason & Co, New York, management and economic consultants.

Miles J. Doan, who had been serving as secretary and assistant treasurer, has been elected secretary and treasurer of Cincinnati Gas & Electric Co. He succeeds **William H. Zimmer, Sr.,** as treasurer. Zimmer continues as executive vice president. **J. Paul O'Brien,** who was assistant treasurer, has been elected controller; and **William H. Zimmer, Jr.,** succeeds him as assistant treasurer. **Harold J. Woehrmyer, Claude E. York,** and **George Eilers,** were appointed assistant controllers.

Russell E. Linton will head a new Public Service Co of Oklahoma engineering department. **Charles Harvey** and **Ed Gastineau** will assist Linton in setting up the department.

Warren Widenhofer, public relations director of Indiana & Michigan Electric Co, has been elected president of the Public Utilities Assn.

George C. Brooks, who rose from meter reader to manager of employee relations, will retire June 1 after more than 41 years' service with New York State Electric & Gas Co. He will be succeeded by his assistant, **Frank R. Doughty.**

Ernest F. Smith, Jr., Kenton Del., has been named to the Delaware Public Service Commission to succeed **Vernon B. Derrickson.**

Philip Sporn, president of American Electric Power Co, has announced he will retire on December 1, 1961. He will then act as a consultant for a seven year period.

General Electric Co has made the following appointments: **William M. Nave,** manager of the Hickory, N. C. distribution transformer plant, succeeding the late **A. C. Boisseau; Kent J. Worthen,** manager of product planning for Point-to-Point Communication; **R. F. Coles,** manager of the Toledo Service Shop; **T. M. Hushen,** manager of the Salt Lake City service shop; **A. W. Warren,** manager of the Richmond service shop; and **C. L. Wilhelm,** manager of the Youngstown, O., service shop.

John M. Hughes has joined Fedders Corp as a central residential sales engineer.

I-T-E Circuit Breaker Co has appointed **Walter S. Caldwell** to the newly created position of utility apparatus engineer for the southern sales region.

Federal Pacific Electric Co has named **Charles A. Schmidt,** industrial marketing manager; **Felix C. Karlson,** merchandising sales manager; and, **Charles G. Sobel,** export marketing manager.

John M. Crawford, sales manager for large steam-turbine generator units, Allis-Chalmers Manufacturing Co, has been awarded an Alfred P. Sloan Fellowship in Executive Development at the Massachusetts Institute of Technology.

Keasbey & Mattison has named **W. H. Mashburn,** Houston district manager, and **Kenneth M. Eden,** general sales manager of the building products division.

N. J. MacDonald, president, Thomas & Betts Co has been re-elected chairman of 1960 National Electrical Week.

OBITUARY

Frank W. McStay, 39, product manager for Kyle switchgear at Line Material Industries, of heart attack on April 27 . . . **Alex C. Boisseau,** consultant to the Hickory, N. C., General Electric plant and former plant manager . . . **Homer Kirkwood,** 71, retired Gulf States Utilities Corp executive.

Arthur J. Hudson, 56, retired electrical engineer with Puget Sound Power & Light Co . . . **R. A. Cuyler,** 61, industrial sales and area development director of Louisiana Power & Light Co . . . **William H. Morgan,** 71, retired supervisor for Consolidated Edison Co . . . **Valdimir K. Yagodkin,** 64, staff electrical engineer of TVA.

BRONZE POWER CONNECTORS

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There are distinct advantages in using Royal for all connector requirements. Royal Bronze Power Connectors featuring ½" bolts for ½" IPS Pipe and larger, and 500 MCM Cable and larger, have been used by Power Utilities for over a quarter of a century.

Royal was one of the first Companies to provide nested bolt-head designs, permitting one wrench installation.

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POWER BRIEFS

Waste disposal permit for Marine Disposal Co of Los Angeles has been proposed by AEC. The firm would get 2-yr contract to dump radioactive wastes about 130 mi off Point Arguella, Calif.

Reactor shutdowns may be avoided by new GE production-line method to ultrasonically test integrity of bonding between uranium core and jacket. Tests would spot any faulty fuel element jacketing.

Atom health control responsibilities need quick Congressional action to provide for return of certain powers to states having adequate regulatory programs. This is point made by Michigan University research project that Detroit Edison Co is helping to sponsor.

Rate reductions are in the works for Florida Power & Light Co and Ohio Power Co. FP&L's cut, based on more efficient use of fuel, totals $2,864,000 for residential and small commercial categories effective May 26. Ohio Power's fuel clause change will amount to $9,900 for 1,500 industrial and large commercial customers.

Low water supply has brought early irrigation load in California. Statewide precipitation is about 65% of normal. Utility problems are not expected because of large surface storage from last year.

Co-ops Slate Jubilee

Co-ops celebrate the 25th anniversary of the creation of REA next year. Four County Electric Membership Corp of Burgaw, N. C., recently sent a $1,000 check, which represents a 10¢-per-member assessment, to NRECA for the observance. The co-op is the first to provide financing for the fete, which NRECA's General Manager Clyde Ellis has described as "a once in a lifetime" opportunity to tell the rural electrification story.

ARMY and NAVY Also Use JAQUES Hydraulic EARTH AUGERS

*Pole-setting attachment optional.

ARMY REPORT ON JAQUES KJ-254**

"There was a performance test on Pilot Model (Jaques Earth Auger), Model KJ-254, built by Texoma Enterprises, Inc. This test performed in accordance with Military Specification Mil-A-516B, paragraph 3.9 through 3.9.2.

"This test was performed in sandy, gravelly, red clay, hard and dry to blue silty clay at bottom of hole. Average time per hole for 25 consecutive holes was 78 seconds. Average depth of holes was 67.2 inches. Machine functioned at normal temperature."

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Niagara Reservoir Fight Goes to Supreme Court

The fight between New York State Power Authority and Tuscarora Indians over a proposed storage reservoir for the $700-million Niagara power project has reached the U. S. Supreme Court.

The Federal Power Commission, in a petition filed for it by the Justice Department, asked the high court to overturn a decision by the U. S. Court of Appeals for the District of Columbia which effectively blocked the use of 1,383 acres of the Tuscarora reservation for the project's reservoir site.

The Appellate Court's decision, "if unreversed, will undoubtedly compel a drastic reduction in the dependable capacity of the vast Niagara hydroelectric project, which will be the largest (2,190 Mw) in the country," the FPC brief states. "This result will frustrate Congress' direction to utilize all of the United States' share of the Niagara River water acquired by international agreement with Canada . . . because the plain fact is that lands of the respondent Indian nation are necessary for the project. . . ."

The Appellate Court ruled in favor of the Tuscaroras last November that the FPC could not authorize the Power Authority to build its already-licensed storage reservoir on Indian land unless FPC could find that flooding of the reservation was not inconsistent with the purpose for which the reservation had been established—under Section 4(E) of the Federal Power Act.

Subsequently, at the court's order, the FPC considered and ruled that flooding of the Tuscarora reservation was not authorized under Section 4(E).

However, the FPC also found that no suitable alternate site, off Indian lands, was available, and the only smaller reservoir site possible would reduce the Niagara project's firm power capacity by 300 Mw. Because of this reduced firm capacity, "The judgment of the court below would preclude the commission from issuing a license to the New York Power Authority for the construction and operation of the complete comprehensive project expressly authorized" by Congress, the FPC brief points out.

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Copies of the specifications, Drawings, Form of Tender and Conditions of Contract may be obtained from the Crown Agents, 4 Millbank, London, S.W. 1., by application quoting the reference Contract EE2 Ghana 1815 on payment of a deposit of £10.0.0 The deposit will be returned on receipt of a bona fide tender.

Tender documents will be available for issue as from the 29th May, 1959 and completed tenders must be delivered to the Crown Agents' Office not later than 1 p.m. on Monday 31st August, 1959.

The Ghana Government does not undertake to accept the lowest or any tender nor be responsible for, or pay for, expenses or losses which may be incurred by any tenderer in the preparation of his tender.

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Invitation No. DS-5196) will be received at Denver, Colorado, until 2 p.m., Mountain Standard Time, June 18, 1959, for furnishing two (2) 230-kv, 1,200-ampere, 5,000,000-Kva and one (1) 14.4-kv, 1,200-ampere, 1,000,000-kva power circuit breakers for Jamestown Substation, Missouri River Basin Project, North Dakota. Delivery is desired within 330 days. For particulars, address Bureau of Reclamation, Building 53, Denver Federal Center, Denver 25, Colorado. Floyd E. Dominy, Commissioner.

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Invitation No. DS-5200) will be received at Denver, Colorado, until 2 p.m., Mountain Standard Time, June 18, 1959, for furnishing two (2) 230-kv, 1,200-ampere, 5,000,000-kva, power circuit breakers for Bismarck Substation, Transmission Division, North Dakota, Missouri River Basin Project. Delivery is desired within 330 days. For particulars, address Bureau of Reclamation, Building 53, Denver Federal Center, Denver 25, Colorado. Floyd E. Dominy, Commissioner.

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Power transformer impulse tester having several years experience, including thorough knowledge impulse equipment and instrumentation. Electrical Engineering education and experience will be consuidered. Excellent opportunity for growth in new, large plant. State qualifications and desired salary. P-1728, Electrical World.

The Meetings Calendar

JUNE

• **National Electrical Manufacturers Association**—Codes and Standards Committee, Claridge Hotel, Atlantic City, N. J., June 1-2; NEMA Industry Accounting Committee, The Homestead, Hot Springs, Va., June 8-9; Board of Governors, NEMA Office, June 16.

• **Institute of Appliance Manufacturers**—Netherland Hilton Hotel, Cincinnati, Ohio, June 1-3.

Appalachian Underground Corrosion Short Course—Sponsored by the West Virginia University, Morgantown, West Va., June 2-4.

Northwest Electric Light & Power Association — Accounting and Business Practice Section, Finlen Hotel, Butte, Mont., June 4-6.

Wisconsin Utilities Association—Accounting Section Convention, Lake Lawn Lodge, Delavan, Wis., June 7-9.

• **Electrical Contacts Seminar**—Pennsylvania State University, University Park, Pa., June 7-12; Electrical Precipitation Seminar, Pennsylvania State University, University Park, Pa., June 14-19.

• **Electric Companies Public Information Program**—Steering Committee, Pierre Hotel, New York City, June 10.

• **National Society of Professional Engineers**—Annual Meeting, Commodore Hotel, New York City, June 10-13.

• **Wisconsin Municipal Utilities Association**—Annual Conference, Elkhart Lake, Wis., June 10-12.

Southern Research Institute — Annual Research Conference, Dinkler-Tutwiler Hotel, Birmingham, Ala., June 11-12.

Indiana Society of Professional Engineers — Annual Convention, French Lick-Sheraton Hotel, French Lick, Ind., June 12-13.

United States Committee for the International Conference on Information Processing—Representing the Institute of Radio Engineers, the Association for Computing Machinery and the American Institute of Electrical Engineers, Paris, France, June 13-22.

• **National Association of Purchasing Agents** — Waldorf-Astoria Hotel, New York City, June 14-17.

• **American Society of Mechanical Engineers**—Semi-Annual Meeting, Chase-Park Plaza Hotel, St. Louis, Mo., June 14-18.

• **American Nuclear Society**—Annual Meeting, Gatlinburg, Tenn., June 15-17.

• **Wood Pole Institute**—University of Wisconsin, June 15-19.

• **National Society of Professional Engineers**—Annual Meeting, Commodore Hotel, New York City, June 17-20.

• **Engineering Progress Exposition**—Sponsored by the National Society of Professional Engineers and its New York State Chapter, Hotel Commodore, New York City, June 17-20.

• **Pennsylvania Electric Association**—Customer Contact Committee, Pocono Manor, Pa., June 18-19; Industrial Committee, Shawnee on the Delaware, June 18-19; Plant Accounting and Records Committee, Skytop, Pa., June 18-19; Taxation Committee, Split Rock Lodge, White Haven, Pa., June 22-23; General and Customers' Accounting Committee, Bedford Springs, Pa., June 25-26; Personnel Practices Committee, Bedford, Pa., June 25-26.

• **Air Pollution Control Association**—Annual Meeting, Statler Hotel, Los Angeles, Calif., June 21-26.

• **American Institute of Electrical Engineers** — Summer and Pacific General Meeting, Olympic Hotel, Seattle, Washington, June 21-26.

• **American Society for Testing Materials**—Annual Meeting, Chalfonte-Haddon Hotel, Atlantic City, N. J., June 21-26.

Michigan Electric Association — Annual Meeting, Mackinac Island, Michigan, June 22-23.

• **Fifth Annual Creative Problem-Solving Institute**—University of Buffalo, June 22-24.

• **American Society of Refrigerating Engineers**—Annual Meeting, Lake Placid Club, Lake Placid, New York, June 22-24.

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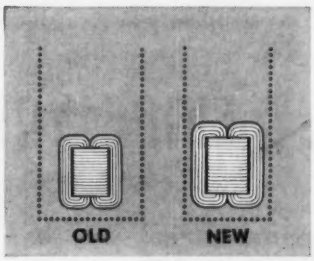

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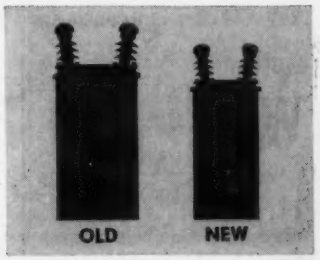

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